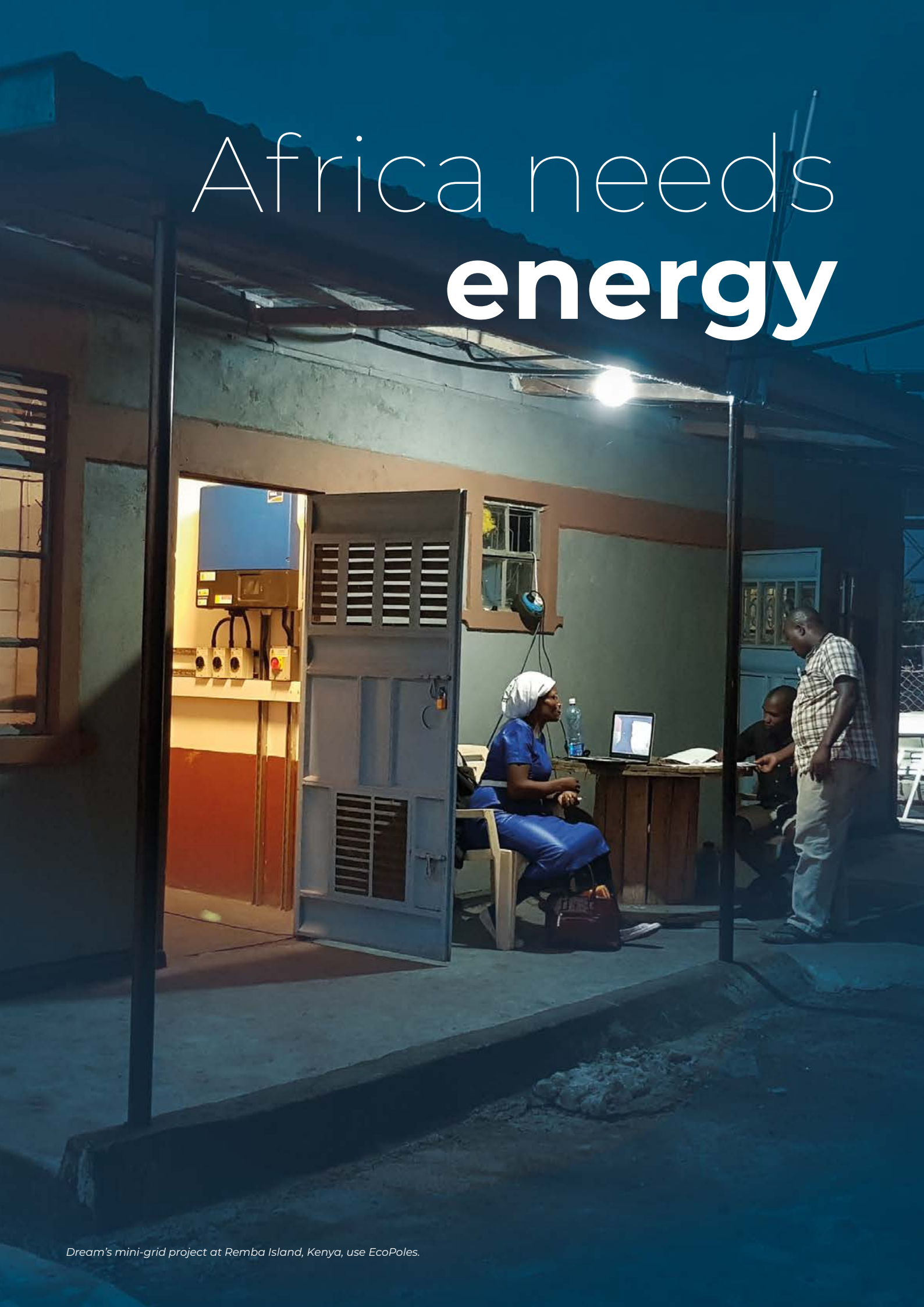




ecopole

The
eco-friendly
utility pole

Africa needs **energy**



Dream's mini-grid project at Remba Island, Kenya, uses EcoPoles.



– Energy needs **distribution**

The idea behind EcoPole came to life as founder Einar Haveland worked at the refugee camp Dadaab in Kenya. As an engineer, he saw the challenges connected with poles for distribution grids. One of the first challenges was all the large amount of wood taken from Africa's valuable forests to produce the wooden poles. He also saw the problems caused by deterioration of the poles by the African nature; sun, woodpeckers, insects and rodents. This is a bad cycle. The need for energy is undisputed, but the consequences of wrong products cause damage to the environment.

The idea this inspired was the vision of a pole that did not cause deforestation and that was durable enough to overcome the challenges of nature. In 2011 he founded EcoPole and started the

development process with support from Innovation Norway and Norad.

EcoPole have local representatives, partners and investors both in East and West Africa, the first production plant in Kenya and headquarters in Bergen, Norway.



Einar Haveland
Founder & VP

Sustainability is the **challenge**

Electricity demand in Sub-Saharan Africa is expected to more than triple by 2040, posing a great threat of deforestation and pollution.

Building energy grids for the distribution of electricity to rural areas is demanding. The investments are high, and the carbon footprint can be of considerable harm to the environment.

MILLIONS OF TREES EVERY YEAR

Today, mainly wooden poles are used for building the necessary electrical grids. Every year, millions of trees are used for this purpose, contributing to deforestation and desertification as the end result. Desertification is the process by which fertile land is transformed into desert.

POLLUTION OF GROUND WATER

In addition to causing deforestation, wooden poles need to be treated with toxic chemicals to protect

against rot and fungi. They are also vulnerable to damage from sun exposure, rodents, termites and woodpeckers. Even with proper maintenance, the average life cycle of a new wooden utility pole is normally under 10 years. The use and eventual disposal of these poles contaminates top soil and ground water.

CONCRETE POLES

Concrete poles are often used as an alternative to wooden poles, even if it has a huge carbon footprint. The concrete poles also erode over time.

TRANSPORT

Transporting and mounting poles in rural areas require heavy machinery and trucks. Lighter poles reduce this to a minimum.



EcoPole is the **solution**

Building an electrical grid requires utility poles that are durable, easy to transport and install, and are cost-effective over time. EcoPole meets these needs as well as eliminating environmental concerns such as deforestation and chemical contamination.

ECPOLE

✓	Lightweight
✓	Non toxic
✓	No corrosion
✓	Sustainable
✓	Long lifecycle
✓	Low carbon footprint
✓	Recyclable
✓	UV resistant
✓	Rain and salt resistant
✓	Pest and rodent resistant
✓	Flexible
✓	No deforestation

CONCRETE POLE

	Lightweight
✓	Non toxic
	No corrosion
	Sustainable
✓	Long lifecycle
	Low carbon footprint
	Recyclable
✓	UV resistant
	Rain and salt resistant
✓	Pest and rodent resistant
	Flexible
	No deforestation

WOODEN POLE

	Lightweight
	Non toxic
✓	No corrosion
	Sustainable
	Long lifecycle
	Low carbon footprint
	Recyclable
	UV resistant
	Rain and salt resistant
	Pest and rodent resistant
	Flexible
	No deforestation



LIGHT WEIGHT



NON TOXIC



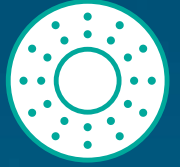
NO CORROSION



NATURAL
BAMBOO



RECYCLABLE



UV RESISTANT



TERMITE
AND RODENT
RESISTANT



FLEXIBLE



RAIN AND SALT
RESISTANT

The advantages of **EcoPole**

In addition to reducing deforestation and ground water pollution, there are several advantages that put EcoPole in front as the superior alternative for the distribution of electricity to rural areas:

- Made of recyclable materials
- Reinforced by natural bamboo fibres
- Low weight makes it easy to transport and install
- A durable construction
- Strong and flexible
- Local production creates jobs and economic growth

As a consequence of its durability, light weight and long lifecycle, EcoPole is the most cost-efficient choice for distribution of electricity.

Advancing the **UN Sustainable Development Goals**



In addition to our own ethical guidelines, EcoPole is working to be compliant with UN Sustainable Development Goals.



NO POVERTY
EcoPole contributes to reducing poverty by creating local jobs.



DECENT WORK AND ECONOMIC GROWTH
EcoPole provides decent jobs and promotes economic growth without environmental degradation.



INDUSTRY, INNOVATION AND INFRASTRUCTURE
EcoPole production involves transfer of technology and training from Norway to Africa.



CLEAN WATER AND SANITATION
Unlike wooden utility poles, EcoPole is not chemically treated, thereby not polluting groundwater.



RESPONSIBLE CONSUMPTION AND PRODUCTION
EcoPole has a long life cycle and is made from recyclable components.



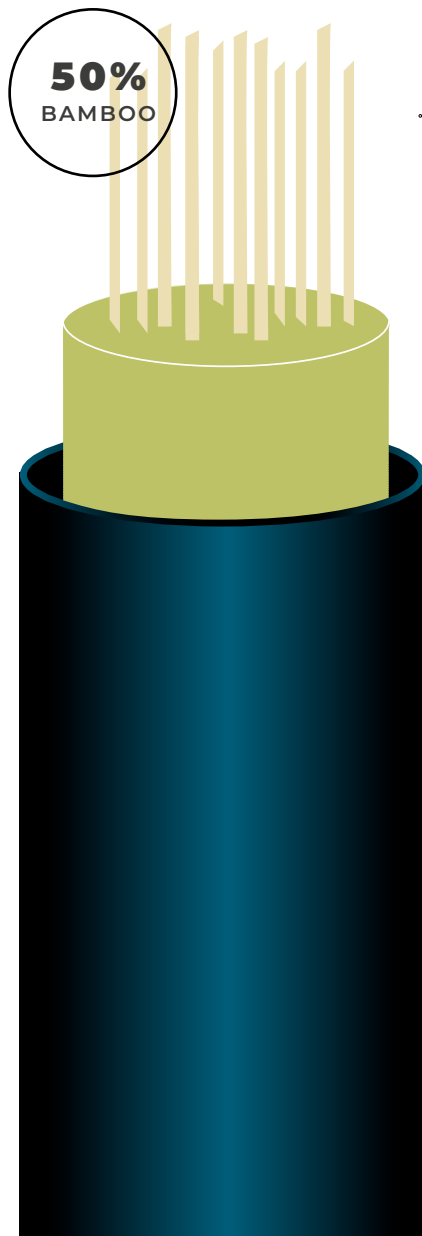
AFFORDABLE AND CLEAN ENERGY
EcoPole electrifies rural areas, increasing the proportion of the population with access to electricity.



LIFE ON LAND
EcoPole helps to reduce deforestation and increase the use and cultivation of bamboo.

Eco-friendly and fully recyclable

With EcoPole, there is no leakage of dangerous substances into ground water or top soil, as EcoPole contains no Creosote or PCA. All materials used in the EcoPole are durable and fully recyclable.



**50%
BAMBOO**

Bamboo

The core component of the EcoPole is bamboo. Unlike trees, bamboo is a fast-growing plant. Within 12 to 18 months, the bamboo has grown back to full size. This makes it a renewable and sustainable resource.

Polyurethane foam (PUR)

The foam inside the EcoPole is light and durable. Some common uses for recycled polyurethane include carpet padding, boards and mouldings that can be used in soundproofing and flooring, and even as raw material for new polyurethane.

HDPE /High density polyethylene

The EcoPole's cover is a pipe made from polyethylene, a fully recyclable and extremely durable plastic material. This is the key factor for the more than 50-year lifecycle of EcoPole. HDPE is one of the easiest polymers to recycle.



NON TOXIC



RECYCLABLE



50%
BAMBOO

Bamboo – **strong** **and sustainable**

Bamboo has unique characteristics, and it is the main component of the EcoPole.

Eco friendly

Bamboo is a plant that grows naturally in tropical areas. It binds the soil and prohibits erosion, as well as contributing to CO₂ capture. It is a global target to increase bamboo farming. After it is cut, it grows back within 12 to 18 months. This means that using bamboo instead of wood has a positive effect on the threat of deforestation and desertification of Africa.

Strong

The compressive strength of bamboo is 2-4 times that of most wood species. The tensile strength of bamboo fibers is tested to be 3 times higher than most conventional construction grade woods (source: INBAR).

Flexible

Bamboo has significantly better bending strength, on average it is twice as strong as most conventional structural woods.



**NATURAL
BAMBOO**



Lightweight

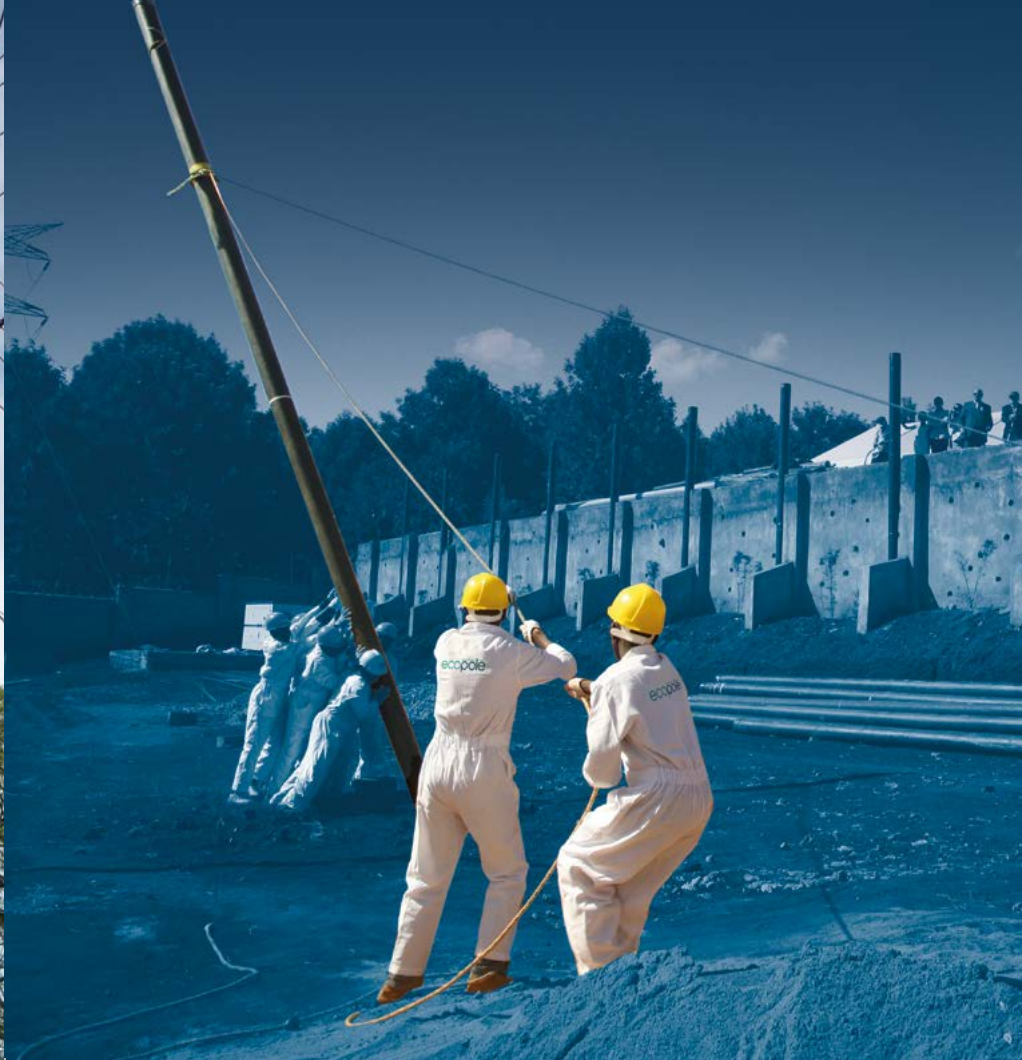
– easy to transport
and handle

All materials used in the EcoPole are lightweight, making the pole 50% lighter than wooden poles and up to 80% lighter than concrete poles. As a consequence, handling is easier and areas with poor infrastructure can be reached.

The poles can be handled by manual labour, both loading, unloading and mounting the pole into place. Cranes can be avoided and smaller vehicles and boats can be used to reach rural areas. The light weight also makes regular transport more cost-efficient, as more poles can be loaded on each truck.



LIGHT WEIGHT



– easy to install

The light weight means that the pole can be mounted by manual labour, and there is no need for concrete foundation or other means of support in regular soil. After an installation hole is dug out according to the width and depth specifications, the pole is simply lifted in and stabilized by the use of ropes and manpower.

The possibility of avoiding cranes and lifting equipment is one of the advantages that makes EcoPole a better choice for energy distribution to rural areas.

Same equipment as for wooden poles

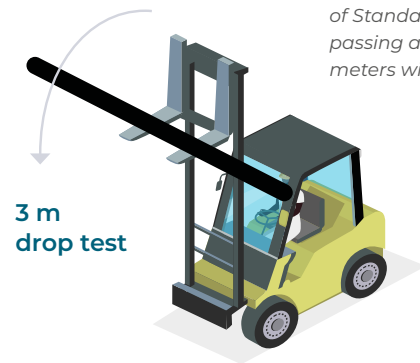
No special tools are required to climb and fit EcoPoles. The poles can be arranged for conventional installation of power transformers, and it uses the same bolts, fittings and climbing equipment as wooden poles. The HDPE outer material and standardized size makes climbing predictable and safe.

No special tools are required to install and climb EcoPoles.



EcoPole is durable

EcoPole meets the requirements of Kenya Bureau of Standards (KS 2513: 2014), passing a drop test of three meters without any damage.



The construction of the EcoPole is specifically designed to make it durable under all conditions. Corrosion, termites, rodents, woodpeckers and UV radiation are the main challenges that make wooden and concrete poles deteriorate over time.

The protective HDPE pipe and the protective polyurethane foam are the key differentiators compared to concrete and wooden poles.

HDPE is a fully recyclable plastic that protects the pole from all these potential damages. The material is tested for a variety of insects and sun exposure over time, without any signs of deterioration. HDPE withstands rough handling, but should the outer layer be damaged by an unexpected incident, the foam inside is also resistant to termites, and the pole will still be intact for a long period of time.

There is no need for maintenance, and the long lifecycle extends the investment period dramatically by the use of EcoPoles. The expected life cycle of an EcoPole is normally 50 years, and we grant a commercial warranty of 20 years.



UV RESISTANT



NO CORROSION



TERMITE AND
RODENT RESISTANT

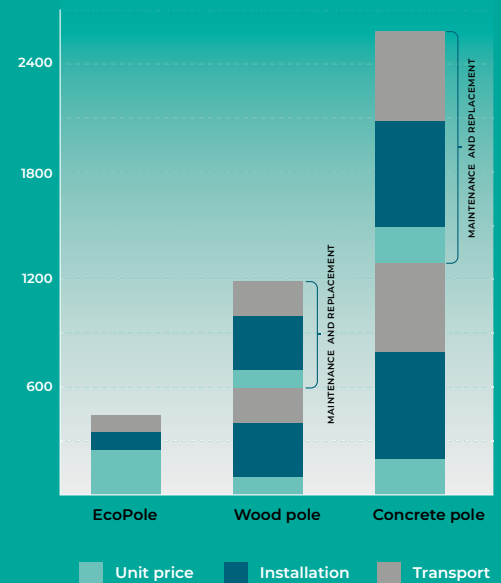
EcoPole is cost-efficient

With its light weight, durability and flexibility, EcoPole is very cost-efficient due to long lifecycle.

- Low weight makes it easy to transport and install
- Durable materials give long lifecycle
- Flexible and resistant to strong winds - will not break

During its lifecycle, considering price, installation and transport cost, EcoPole is a better investment than both wood and concrete poles.

Cost estimate (in %) 20 year lifecycle



EcoPole is flexible

The unique material composition makes the poles both strong and flexible. This allows them to withstand high wind loads and vibrations.

The strong bamboo fibres are held in place by a semi-rigid polyurethane foam, forming a unique combination. Unlike concrete and wooden poles, the composite pole will not experience sudden fractures at high loads. Instead, the pole will gradually bend and not break and cause no harm to the surroundings.

EcoPole has a controlled deformation at high loads and will not break. Extensive load tests even show that the pole will straighten itself shortly after unloading.



FLEXIBLE





Norwegian engineering – Local production

Transfer of technology

EcoPole is developed, designed and engineered in Norway, and manufactured in Africa. This results in a transfer of know-how, local production and administrative jobs connected to the EcoPole projects. This reduces both logistics and carbon footprint.

Local partnerships

Most of the materials that go into the production of EcoPole are manufactured in Africa. EcoPole cooperate with local companies that meet our requirements both in know-how, quality and ethical guidelines.

Growing local economies

For all major projects, EcoPole will set up a plant locally. This is a sustainable solution, with locally-sourced materials and reduced need for transportation. In addition, local jobs are created at the plants, both for trained and unskilled labour.

When EcoPole sets up a manufacturing plant, this also leads to jobs for local bamboo farmers, supplying dried bamboo as raw material for the production. EcoPole helps local economies to grow.





Bottom left: Locally sourced bamboo ready for processing in Kenya.

Above: Local training and transfer of know-how from Norway to Africa.

Bottom right: EcoPole factory in Nairobi, Kenya.



www.ecopole.no

EcoPoles
consists of

50%

BAMBOO

ecopole

ECOPOLE AS

Office: +47 32 69 98 00
www.ecopole.no
mail@ecopole.no
PO Box 156,
5868 Bergen
Norway

ECOPOLE GROUP

Mr. Einar Haveland, VP
Cell Phone: +47 48 162 626
haveland@ecopole.no

EAST AFRICA

Mr. Lars Jensen
Cell Phone: +254 722 513 039
jensen@ecopole.no

WEST AFRICA

Mr. Joe Ndiaye
Cell Phone: + 221 777 929 094
joe@ecopole.no