



# HEDGEHOG ENERGY

Building the Foundation for a Renewable Energy Future



## Without Storage, Renewable Development is Limited

Wind and PV are the most important renewable energy technologies, but the electricity they produce is intermittent and unpredictable. With a large share of renewable generation, Germany is already seeing the problematic implications of this intermittency expressed in the energy market as increased price volatility and negative prices – times of overproduction when firms are paid to consume power. With strong targets for renewable generation and the phase-out of nuclear, price volatility will continue to increase. Energy storage is seen as the answer, but the development of additional storage it is not yet economically feasible.

## Meeting the Demand for Storage using Existing Assets

This unmet demand is the basis for our business. Negative prices allow us to separate the consumption and production aspects of storage, and to deliver each separately, using established technology, and existing assets. Utilizing this unique market context, we are able to profitably meet the immediate need for energy market stabilization, and in this way to allow for the further expansion of renewable energy generation capacity.

## Connecting Untapped Capacity to Existing Markets

Our approach requires business model and technological innovation. To develop the business system, we bring together owners of generation and consumption equipment, and existing energy markets. Access to assets is negotiated directly with owners, and with contracts in place control systems are installed. Now interconnected and dispatchable, this decentralized capacity is pooled, and packaged into products suitable for existing energy markets.

Initially, the most interesting of these is the German intraday spot market (EPEX). Here capacity is bought and sold 75 minutes before delivery, and price volatility is most apparent. For this market, generation capacity is bundled into commodity contracts, which are then sold at market prices at times when our assets can be profitably utilized. Additionally, ancillary services such as spinning reserves and regulation capacity can be contracted directly with grid operators. These services represent a second market in which our assets can be utilized.

## Innovative, and Profitable; Supporting Renewable Energy

To realize this innovative model, and successfully deliver this product to the market, we must invest in the development of an and directly linked to real-time energy markets. Today, the lack of storage specific control and trading systems, and market expertise are critical roadblocks to development of the industry. The capabilities we develop through providing the function of storage in the market address these directly, developing the necessary capabilities, and building the foundation for a strategic transition into the storage industry. Our business model is profitable in the short term, but will always represent a specialized niche within the energy generation market; however, in the storage market this same control and trading platform and market expertise translate into a fundamental advantage in the IT systems and asset management areas of this potentially huge market.

## Winner of the 2011 CLJ; Funded for Rapid Growth

This business concept emerged from the summer 2011 Climate KIC Contextual Learning Journey. With the constant support of our coaches, and feedback from judges and industry sources, the project developed from a general understanding of a energy storage into an innovative and promising business model. After winning the competition, we made the decision to pursue the further development of this business in Switzerland, drawing on expertise in energy storage and trading. In September we received Stage 1 financing from the Zurich based incubator Venture-KICK. Combined with stipends offered from Climate KIC Switzerland, this allows us to relocate to Zurich, and to dedicate ourselves full-time to this project for time for the next six to nine months.

## A Diverse, Innovative, and Enthusiastic Team

Our founding team brings together expertise in mechanical engineering, energy markets and policy, IT development, entrepreneurship, and wind industry innovation. We have the skills and knowledge to develop the business model, analyze the markets, and develop the architecture and requirements of the control and trading platform. As we move towards launch, we need someone with decades of hard earned experience, but for the first six months, we're Hedgehog Energy.

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## Arboreal Executive Summary

Deforestation is responsible for over 17 percent of global greenhouse gas emissions - the third highest proportion of human-induced emissions after the energy and industrial sectors (IPCC, 2007). Mitigation against climate change depends on international cooperation and agreement and on the involvement and empowerment of tropical forest communities.

Creating a direct link between local economic well-being and the protection of forests and their biodiversity is an effective way to prevent deforestation by making use of the resources the forest can offer. Non-Timber Forest Products (NTFPs) provide a sustainable economic and environmental opportunity to achieve this link. NTFPs are natural commodities, used in agriculture, cosmetics and pharmaceuticals, which can be harvested from forest areas without environmental degradation or deforestation. Some examples of NTFPs are the Neem tree, Brazil nuts and cacao. These products rely on the preservation of forest integrity and biodiversity, so once communities are deriving a sustainable income from NTFPs, they are equally accountable for preventing deforestation to protect their livelihoods. In some countries, this equates to increased government legislative protection, and in others, local action is effective on its own.

The majority of NTFPs have low market value in their raw form, and gatherers have little option but to sell the raw material to intermediaries who process them to create a market-ready product with a greatly increased value. For example, the market price for Neem seeds in India is €0.02 per kilo. Once processed into oil, the product can be sold on the national market for €1.25 per kilo. Selling higher value NTFP products could provide a reliable and sustainable incentive for rural communities to protect the forests. This could have a huge social impact by creating employment opportunities that were previously unavailable.

Arboreal's business concept is to sell self-contained mechanical processing centres to allow cooperatives in tropical forests to process NTFPs. The processing centre contains the machinery to create a higher value product from a raw NTFP as well as storage and packaging facilities. Arboreal will also provide the necessary training, coaching and networking services for the cooperative to run an effective business and have access to distribution channels for their final product. By creating small-scale local industry we help communities move up the value chain, and have a positive social, economic and environmental impact.

We will generate revenue from a premium on the sale of each processing centre (€50,000 each), and require an initial investment of €100,000 to cover our start-up costs. An analysis of the most likely scenario shows we could reach our cash-flow break-even point after three years. We also calculated the necessary margin to be generated by each processing centre to allow the cooperative to pay back the micro-finance loan required to purchase an Arboreal processing centre. This demonstrates to local communities that the risk of the loan is far outweighed by the profit potential of selling processed products.

Arboreal's core team brings diverse skills and knowledge to the business. Collectively we have experience working on development projects across South America, Africa and India, as well as the financial and engineering expertise necessary to make this business a commercial success.

To successfully implement economically viable businesses in tropical forest areas, Arboreal's core team will work closely with local project managers, employing at least one person close to each implementation site. We envisage that in our first year of operations, we would sell a single processing centre, to prove the economic viability of the concept, and then increase unit sales over the following years.

Through these activities we will create a trusted brand of NTFP processing centres to enable us to protect against deforestation in tropical forests across as many global regions as possible. These aims make us ideally suited to the structure of a social business – realising benefits for the local community and environment as well as for Arboreal and measuring our success against the triple bottom line:

1. Economic – creating profit for Arboreal and for forest communities
2. Social – generating self-sustaining industry and equipping local communities with the skills to run effective businesses
3. Environmental – protecting tropical forest areas against deforestation

Our competitive advantage in this field is our ability to integrate the stakeholders required to make this enterprise a success. Arboreal will deliver value by providing cooperatives with all these components to create a holistic solution for processing NTFPs. As the market for NTFPs develops, this will continue to be an entry barrier for many, along with the reliance on exploitative practices to generate large profits. As a social business with the passion and determination to make this industry sustainable, Arboreal is a unique investment opportunity with fantastic potential.





**Edouard Martins**  
Physics PhD  
Remote Sensing  
Reading / London

The timeline chart displays the progress of various projects from October 2011 to December 2012. The header shows the months and years. The chart includes a series of horizontal bars representing different projects. Two key milestones are highlighted: 'Register company' in January 2012 and 'Launch first retrofitting' in September 2012.

2011			2012											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project 1														
Project 2														
Project 3														
Project 4														
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Farmers of the Northern Region face the problem of **soil degradation** caused by an insufficient amount of organic matter and nutrients in the soil.

The consequences are:

- low water holding capacity
- poor nutrient retention
- low soil fertility

→ Overall this leads to a significant decrease of the crop yield potential

In Conclusion: DeCo!'s approach creates incentives for farmers, establishes a self-supporting composting system, creates jobs for low and high skilled workers and improves the municipal waste situation.

DeCo! is grateful to have close partnerships with:



## DeCo!

### Sustainable Farming



## DeCo!

### Sustainable Farming

Producers of Compost  
and Organic Fertilizer  
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T: 024-2130502  
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DeCo! is an NGO limited by guarantee producing organic fertilizer for small-holder farmers in the Northern Region of Ghana.

We are building up a decentralized composting system around Tamale.



## The Situation

- The **currently** applied chemical fertilizers only have a **short-term impact** on the nutrient level of the soil
- **Nutrients** are **washed away** due to the low content of organic matter
- **No official supply of organic fertilizer** is offered in the region
- **Farmers lack knowledge** on the techniques of producing compost



## Our Solution is to...

- **Buy** the farmers' and municipal **biodegradable waste**
  - Provide a **composting service**
  - Produce a **ready-to-use organic fertilizer** for the local farmers
  - **Improve** the water and nutrient holding **capacity** of the soil and **enrich it with humus**
- **DeCo!** fertilizer has the potential to **double crop yields**

## DeCo! uses...

- a well-established composting technology adapted to **regional conditions**
- a **decentralized composting** approach
- a low-tech concept which substitutes expensive equipment with **local labor** force
- a **franchising system** which leads to faster scalability and encourages local entrepreneurship



## Why to support DeCo!

- Reduce soil degradation and erosion
- Improve food security
- Create new jobs
- Reduce greenhouse gas emissions
- Improve waste management
- Strong partnerships
- Transparency and publicity



**SEED Awards  
2010  
WINNER**

