

## **End of project popular science description**

### **Gecko – Green and Circular Innovation for Kenyan Companies**

#### **Introduction**

The Danida Window 2 funded Gecko project (2018-2021) aims to provide scientific insights for designing and projecting high-circular eco-industrial parks in an emerging economy such as Kenya. The project aims to contribute to the development of a national strategy for eco-industrial parks in Kenya as part of their wider circular and green growth strategy. Gecko investigates if and under what conditions developing countries such as Kenya may gain environmental and competitive advantages from early entry into circular ways of organizing production and the exchange of resources in symbiosis networks, thereby potentially establishing near closed-loop production systems. This may simultaneously solve sink and source problems and be important for strategic decisions on future planned huge investments in centralized expensive End of Pipe environmental infrastructures (waste incineration and waste water treatment plants). Potentially, circular decentralized solutions targeted the large sidestreams of manufacturing companies may reduce the need for such centralized investments. The Gecko project hence looks into circular leapfrogging opportunities by targeting the upcycling of industrial sidestreams in Kenya as a basis for forming circular business networks and -parks.

More specifically, the project investigates industrial symbiosis potentials from both a business, policy and natural scientific point of view. We focus on a case area in Nairobi, Ruaraka industrial area, and 26 mixed manufacturing companies which represent the majority of the medium and larger companies in this area.

In doing so the project feeds into Kenyan policy targets to accelerate their industrialization as a core means of achieving fast economic development. They aim for green growth and a transformation to a circular economy, including the development of eco-industrial parks. The project also feeds directly into the Danida Strategic Sector Cooperation (SSC) program which currently targets green and circular industrialization in Kenya and the companies in Ruaraka, hence the case area has been defined by SSC.

The Gecko project is headed by associate professor Maj Munch Andersen, innovation strategy researcher at the University of Copenhagen. The Gecko project combines business innovation research, technical and natural scientific research as well as policy studies. The project was delayed and disrupted because of Covid 19; original researchers from the Technical University of Denmark and from University of Nairobi and Kenyatta University left the project, leaving only University of Copenhagen and Kirdi (Kenyan Industrial Research Institute, headed by Senior Researcher Kelvin Khisa) to finalize the project, which was extended until end 2021. Additionally, the Ruaraka business organization Rubicom has been an important partner.

A range of Kenyan stakeholders has participated via the Gecko advisory board coming from the ministry of Industry, the ministry of environment, the environmental protection agency, the Nairobi County, the water and waste water utility and the Kenyan Association of Manufacturers (KAM).

#### **The methodology:**

Case companies were mobilized via dialogues, a survey and in situ circular screening with a multidisciplinary research screening team using a circular screening tool followed, succeeded by circular business model workshops. Further dialogues and samples followed. Interesting circular innovation/symbiosis opportunities were identified and targeted mainly at 5 food companies. In non-food sand industrial symbiosis of sand and boiler ash sidestreams into concrete was identified as well as plastic

and textile waste for composites. Additional More testing and research was interrupted by Covid 19. Online zoom meetings during Covid lock down with researchers and companies were held with the core companies highlighting and discussing the circular innovation opportunities, possible symbiosis matches, research needs and further steps.

## **Results**

We see the mobilization of the 26 manufacturing companies out of 31 targeted as a big success, demonstrating that Kenyan companies are more ready for a circular transformation than anticipated. The project has led to new insights among the participating partners on upcycling opportunities and conditions for engaging in industrial symbiosis in a Kenyan context.

The project identified severe research gaps. The upcycling of the industrial sidestreams into high value products require in most cases considerable research, even very novel research which extended beyond the means of the Gecko project. This is none the least the case in the food area; also regulatory barriers are in need of more analyses and knowledge on green business development in Kenya is also very limited.

The Gecko insights have been used to formulate and obtain a larger/better research project, the Geckocir project, running 2022-2026 that we believe will take us very far towards achieving the original goals of the Gecko project of facilitating the making of circular industrial parks and - networks in Kenya, including contributing to the formulation of a national strategy for eco-industrial parks and -networks in Kenya. The Gecko project, even though disrupted by Covid 19, has brought attention to the potentials of circular industrialization in Kenya, and has contributed to the formulation of circular industrial policies, none the least because Hezekiah Okeyo, the director of the green growth and circular economy strategies in Kenya in the ministry of industry in Kenya, has been on the advisory board as well as doing a PhD using the Gecko case companies in Ruaraka.

## **Conclusions**

The Gecko project shows that the potential for circular industrialization is high in Kenya if companies and researchers are properly supported. It also shows that substantial amounts of R&D and innovation projects are needed to upcycle the sidestreams into high value products and promote the formation of circular business models in Kenyan companies. Kenyan stakeholders are broadly becoming very interested and positive towards the circular economy agenda which facilitates the circular transformation greatly.

## **Recommendations**

We suggested that company – research collaboration is further strengthened in Kenya and supported by innovation projects. There is a need for more ‘carrot’ and less ‘stick’ to move Kenyan companies forward fast in a green direction. The circular transformation is very difficult and complex and in need of much research support to succeed, or it may lead to long term lock-in to suboptimal solutions.

It would be advantageous with two stage Danida research projects. First a 2-4 year pilot project which, if promising, could be expanded into a 3-5 years follow-up project. It takes time and many resources to work with Kenyan companies.