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Netherlands: Calls for a bio-based economy

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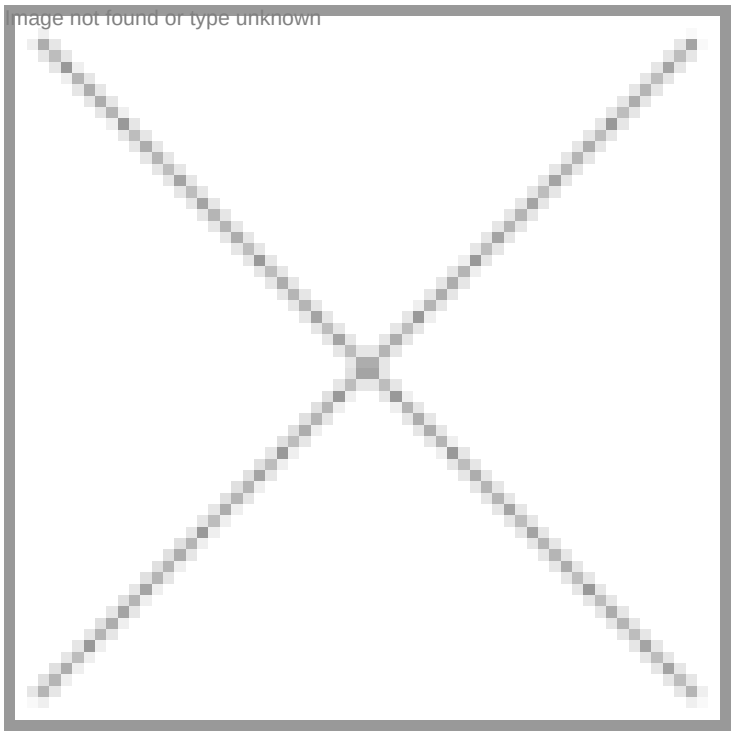

The Netherlands is striving towards an economy that is largely based on natural resources for production of energy, chemicals and materials in such a way that competition with food production is minimal

Taking the government, industry, and R&D institutes as the building blocks of the new plan for a bio-based economy, the Dutch ministry of Economy, Agriculture and Innovation has established a roadmap for sustainable development and is inviting investments into the rich sector.

The Dutch believe that natural resources can be used to produce much more than just energy; they can be processed to extract valuable components which in turn can be used to produce biochemicals, pharma drugs, biomaterials, bioplastics and much more. â€œThe current investment for the bio-based economy here is 450 million Euros,â€? says Cornelis Mijnders, manager of Holland's national program for bio-based economy. There are companies of all sizes and research institutions that are developing new technologies to process natural raw materials, such as wheat, palm oil, soy, rapeseed, miscanthus, calendula oil, hemp, jatropha, algae, wood and paper waste to be used in agriculture, as additives in paint, to produce construction material, fiber and also chemicals for drugs and cosmetics.

The varied technological expertise combined with subsidy schemes for processes like biorefinery pilot and demo, product development, production of second generation biofuels and import of biofuels brings forth Netherlands as a potential place to invest in. The Netherlands Foreign Investment Agency (NFIA) helps by offering one-point contact, personal guidance, tailor-made support and, most importantly, technology matchmaking. â€œWe have a culture of openness to foreign investment, and almost 50 percent of the Dutch GDP comes from international activities,â€? says Bas Pulles, commissioner, NFIA. â€œWe have favourable tax treatment for foreign employees, which otherwise is very high.â€? Netherlands also promotes public-private partnerships.

BioSpectrum takes a look at some companies that are doing very innovative work as contribution towards a bio-based economy:

Plant extracts for bioplastic

Two companies, Avantium and Purac, have patented technologies that use plant extracts to make chemicals which can be used to make bioplastics for manufacturing recyclable and degradable plastic bottles, packaging materials, coatings, polyester fiber and food additives.

Purac has developed a new method to make lactic acid from sugar in a process that has low carbon footprint, and isgymsum free. Bacteria derived from nature is used to ferment the sugar, following which separation and purification is done to produce the polylactic acid (PLA). This PLA is being used in producing a host of products like plastic glasses, plastic-coated food boxes, packaging materials, bone screws, biofoam. It can be also used in food products as preservatives instead of lactic acid. Going forward, the company will modify its process, which will use bagasse (byproduct from sugar mills), wood waste and paper waste to derive PLA.

The company Avantium, which was formed as a spin off from Shell, has specialized in chemical research and has patented technology to develop resin from biomass by breaking the carbohydrates present in such feedstock into building blocks. This resin is used to make bioplastic and in turn something which is termed as a plant bottle. Avantium boasts of clients like Coke

that has vowed to start using these plant bottles for all their packaging purposes in the future. This is called PEF (Polyethylene furanoate). Avantium says that the PEF bottle has six times better oxygen barrier, two times better carbon dioxide barrier, and also two times better water barrier than PET (polyethylene-terephthalate). These characteristics make the bottle safer and longer lasting than PET bottles and allows for packaging of fruit juices also. The company envisages that in future, PET bottles will be fully replaced by PEF bottles. The biggest advantage is that for processing of carbohydrates instead of oil (PEF is made from oil), existing plants can be used and manufacturers wouldn't have to worry about building another huge steel structure.

Petten, the energy research capital of Europe, houses The Energy Research Centre â€“ ECN. The ECN does thermochemical conversion of biomass which produces both heat and power, as well as green gas called SNG, which is injected to the grid for industrial and household use. It captures the carbon and reuses it, resulting in zero carbon emissions. The center's biomass gasifier can handle a variety of biological materials. In the final phase, it has developed a special process for removal of tar from the gas produced. The ECN is in talks with Thermax Pune for joint development of plants in India.

Tapping the richness of algae

Another very interesting development is by Feyecon, which uses carbon-capture technologies towards achieving a host of things like extracting valuable components from algae, extracting components from cannabis to make medicines for nausea, air drying of food products (like mushrooms, raspberries) and encapsulating small particles of active materials with a fine coating, which can retain its value for long. The coating is made of sugar and cellulose-based natural polymers. Components such as iron can be encapsulated into grain composition and can be used for fortifying food products. The company uses pressurized carbon and has identified myriad applications of the same. One of its spin offs, AlgaeBiotech, utilizes Co2 under 100-150 bars of pressure to extract omega-3 rich oils, anti oxidants and herb extracts from algae colorants. And lastly, the company uses the byproduct to make fuel. Feyecon says that algae is a kind of natural renewable resource which has very rich components and fuel should be derived only after extracting all of these valuable components.

Novel water treatment

A company called Paques in The Netherlands does water purification in a novel form. It removes and extracts phosphate from the water and stores it in crystalline form. It is said that phosphate will become one of the scarcest resources in near future, and hence it is being seen as a smart move to extract and store phosphate to be reused instead of throwing it away. Not only phosphate, they remove ammonia also by adding magnesium oxide. Bacteria is used further to convert the nitrates present into nitrogen gas and the biomass is retained. The company is doing this for the waste water from the largest potato factory in Netherlands â€“ Aviko.

Biofuel from byproduct

BioMCN lies in Northern Holland, which is known for its agricultural wealth. The company produces biomethanol, which is a biofuel and can be added to petrol. It is derived from crude glycerine, which itself is taken as a byproduct from biodiesel plants from all over the world.

Mr Rob Voncken, CEO of BioMCN says, â€œBiomethanol is 75 percent of the price of normal ethanol, and results in Co2 savings of 73 percentâ€?. From the process that BioMCN uses, biomethanol is produced in equal quantities to the glycerine which is used. BioMCN has a refinery which has the capacity of 4,00,000 tons.

The Netherlands aptly showcases opportunities in investment in various fields, like export of biomass, setting up of plants, using the technologies and taking the aid of technology experts, and also using the storage capacities of Rotterdam and Amsterdam ports to store products. The Netherlands government promises easy and smooth setup and operations with aid from the NFIA as well.

Mr Rajiv Rangarajan, who owns an Indian company Godavari Biorefineries B V, which converts renewable biomass to chemicals and has been doing business in The Netherlands, says, â€œNetherlands was the gateway to the rest of the Europe and has excellent logistics and supply chain services. And when we combine it with the labour and taxation schemes, it becomes a very important and practical destination for investmentâ€?.

- Meenakshi Rohatgi from the Netherlands

(The author was in the Netherlands at the invitation of the Netherlands Foreign Investment Agency, Dutch Ministry of Economic Affairs, Agriculture and Innovation)