JITRI
JIANGSU INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE

JSTD Jiangsu, China
Science and Technology Department

WAITRO
WORLD ASSOCIATION OF INDUSTRIAL & TECHNOLOGICAL RESEARCH ORGANIZATIONS

Sustainable Technologies Open for Cooperation

August, 2021

CONTENT

I. AGRICULTURE

Demonstration and Popularization of New Soybean Varieties with High Yield and Disease Resistance in Thailand and Myanmar

(Jiangsu Academy of Agricultural Sciences, China)

1. Abstract

'Sudou 7' and 'Sudou 22' are new soybean varieties characterized by high yield, disease resistance and high quality. They can be harvested as immature seeds (fresh vegetable) or dry seeds. Soybean rust is a potentially devastating disease posing a serious threat to soybean industry in Thailand and Myanmar. 'Sudou 7'and 'Sudou 22' have shown good resistance to soybean rust. Demonstration and popularization of these soybean varieties can not only significantly improve the grain yield of dry beans in these countries, but also enrich the varieties and types of local vegetable markets, increasing the economic income of local residents.

2. Organization Introduction

Jiangsu Academy of Agricultural Sciences (JAAS) is a comprehensive agricultural research institution since 1931. Plant & Animal Science and Agricultural Sciences at JAAS were ranked in the top 1% in the world according to the 2017 ESI rankings of research fields by Clarivate Analytics. Institute of Industrial Crops at JAAS is one of the earliest units to carry out bean research in China. In the last 20 years, 45 new varieties of beans have been cultivated, including 18 vegetable soybean varieties. The breeding and popularization of these new bean varieties have greatly promoted the development of soybean industry chain.

3. Research Areas

Agriculture, Farming, Vegetable, Vegetable Processing

4. Opportunity Description

Opportunity description: In Thailand and Myanmar, the major problems of soybean production are listed as follows: Firstly, it's difficult to improve the yield because of the short vegetative growth period caused by high temperature. Secondly, rust infection is often encountered in soybean production. Our technology relies on varieties, and we select suitable varieties with long basic vegetative growth stage to solve the problems of low biological yield and unstable economic yield. At the same time, our varieties have good

resistance to soybean rust, which can fundamentally solve the two main problems of soybean production in Thailand and Myanmar.

Technological process: Based on the international cooperation and good trust among partners, we will bring these two new soybean varieties, 'Sudou 7'and 'Sudou 22', to the relevant demonstration areas in Thailand and Myanmar on the premise of consistent wishes of three parties. We will arrange timely sowing in the demonstration area through technical training and field demonstration. On-site observation and popularization of new varieties will be carried out in middle stage and before harvest in order to greatly accelerate the promotion speed of new varieties.

Economic benefits: The yield of dry soybean seeds will increase by 15% - 20% per mu (667 m^2) when planting of these two soybean varieties. At present, the average yield of dry soybean seeds in Thailand and Myanmar is 144 kg per mu. According to our introduction trial, the yield can reach 170-175 kg per mu, so the yield per mu can increase by 30 kg and the value-added is 105-120 yuan. If the planting area covers 500000 mu, the net benefit will increase by 50 million yuan. In addition, if the market of vegetable soybean is constantly being explored and developed, earnings per mu of vegetable soybean will increase by 500 yuan. Planting 100000 mu of soybeans can increase the net income by 50 million yuan. The total added value is 100 million yuan.

Ecological benefits: Soybean is a typical nitrogen fixing crop. The nitrogen fixed by soybean rhizome, leaf and root is equivalent to the fertility brought by 30 kg fertilizer. Cultivation of soybean can save the utilization of fertilizer, and the amount of fertilizer required by soybean is only about half of that of gramineous crops. Planting of soybean can reduce agricultural chemical input and agricultural non-point source pollution, thus leading to a better environment, including water resource environment, agricultural soil environment and air quality.

'Sudou 7' and 'Sudou 22' were bred by conventional breeding techniques, and were obtained by hybridization, self-crossing and purification. 'Sudou 7' and 'Sudou 22' show stable genetic basis and resistance. In consequence, there is no risk of extensive reduction of yield during the demonstration and popularization. In addition, environmental risks from the release of genetically modified organisms do not exist. It is important to notice that do not sow during the high temperature period from April to September every year. There are no other technical risks.

5. Country Focus

Thailand, Myanmar

6. Partners Contribution

It is necessary to maintain the soybean seed base and add some essential facilities and equipment during the implementation of the project. Both parties need to jointly study the

implementation plan, to organize field demonstration and business discussion.

7. LOOKING FOR...

University, Research institute, Company, etc.

Prevention and Control Products of Mycoplasma Pneumonia of Swine

(Jiangsu Academy of Agricultural Sciences, China)

1. Abstract

Mycoplasma hyopneumoniae infection causes persistent respiratory diseases in pigs. The global infection rate is over 90%, causing serious economic losses. This opportunity includes an attenuated vaccine, an inactivated vaccine and a diagnostic kit, which all have been licensed in China. The above three products can be used alone or in combination for effective prevention and control of mycoplasma pneumonia in pigs.

2. Organization Introduction

Jiangsu Academy of Agricultural Sciences (JAAS) is a comprehensive agricultural research institution since 1931. JAAS strives to make agriculture more productive and sustainable through technology innovation. JAAS endeavors to carry out the Plan for Rural Vitalization Strategy and our innovation serves agriculture, farmers and the rural areas. We provide more than 80% of new varieties, products and techniques in Jiangsu, China. We are teaching farmers not only to increase yield and quality, but also to challenge conventional practices in pursuit of original ideas in agro-environment protection.

3. Research Areas

Animal Health

4. Opportunity Description

A. the attenuated Mycoplasma hyopneumoniae vaccine (168 strain): The first attenuated mycoplasma hyopneumoniae vaccine in the world and licensed in 2007. Currently only China and Mexico have live mycoplasma pneumoniae vaccine. In 2015, it won the National Invention Technology Award of China, and has been transferred to 4 Chinese veterinary biological products enterprises. The immunization protection rate is more than 80%, and hundreds of millions of doses have been used in China.

B. the inactivated Mycoplasma hyopneumoniae vaccine (NJ strain): This inactivated vaccine of mycoplasma hyopneumoniae was prepared by using a field-isolated virulent

strain (NJ strain) combined with white oil adjuvant. Two doses of immunization can achieve more than 60% of the immune protection rate, can also be combined with live vaccine (168 strain) for immunization, immunity protection is higher.

C. the ELISA kit for detecting sIgA antibody against Mycoplasma hyopneumoniae: This kit targets the secreted IgA (sIgA) antibody in the respiratory tract, usually from a nasal swab. It can be used for the early diagnosis of mycoplasma hyopneumoniae infection in pigs. Moreover, because of its function of distinguishing infection from the vaccinated animals (DIVA), it can be used to evaluate the immunological effect of vaccines, which filling the gap of the lack of rapid evaluation tools for mycoplasma hyopneumonia vaccine.

5. Partners Contribution

Help to license or promote vaccine and diagnostic kit in the countries along the Belt and Road Initiatives

6. LOOKING FOR...

Animal biological products enterprise or agencies

An Environment-friendly Product against Spodoptera Frugiperda -1.5% Chlorfluazuron. 6×108PIB/ml Spodoptera Litura Nucleopolyhedrovirus SC

(Jiangsu Academy of Agricultural Sciences, China)

1. Abstract

The fall armyworm, *Spodoptera frugiperda* (Smith), is a recent invasive insect pest in many countries which becomes a new threat of food safety worldwide. 1.5% hlorfluazuron. 6×108PIB/ml *Spodoptera litura* nucleopolyhedrovirus SC is a new product against FAW, at the dose of 800ml/hm2, its efficacy in corn field is about 85%. The product is a complex of insect virus and insect growth regulator which has synergistic effect, and it is safe to other organisms and the environment. Other than that, the product also has less resistance risk than the common chemical insecticides. Transfer of the product to other countries in Asia and Africa is very important for the sustainable control of fall armyworm.

2. Organization Introduction

Jiangsu Academy of Agricultural Sciences is a comprehensive agricultural research institution since 1931. JAAS strives to make agriculture more productive and sustainable

through technology innovation. The Institute of Plant Protection in JAAS focuses on basic and applied research on the occurrence rules of pests and diseases, along with green control technology.

3. Research Areas

Biological control of insect pests

4. Opportunity Description

Corn is one of the most important crops in the world. Fall armyworm (FAW) is a recent invasive insect pest which has spread to many countries, it has a caused serious threat to corn production. Environment-friendly insecticides are powerful agents to suppress FAW. Current insecticides available to fall armyworm control are still very limited. Nucleopolyhedroviruses (NPVs) have received considerable research attention because they provide attractive alternatives to broad-spectrum insecticides and have the potential to be used in integrated pest management (IPM) programs owing to their efficacy, specificity, production of secondary inoculum and lack of non-target effects. However, the inherent limitations of NPVs including a slow speed of kill, high cost has limited their usage. 1.5% chlorfluazuron. 6×108PIB/ml Spodoptera litura nucleopolyhedrovirus SC is a new product which is a complex of insect virus and insect growth regulator, chlorfluazuron has synergistic effects on NPV, and the product has been registered for controlling common cutworm and fall armyworm in China, and shows high field efficacy against the pests.

The product can be an ideal option for the sustainable control of fall armyworm. It does not only safely control the insect pests, but also hardly develop resistance against the pests. Compared to common chemical insecticides, the cost of our product is not too high, and the storage and usage is the same as chemical insecticides. So the product is a promising product for controlling fall armyworm.

5. Partners Contribution

We expect our partners can open up new market for our product, and train the farmers to properly use the product.

6. LOOKING FOR...

Company focus on chemical production and sales, agricultural technology extension station

Enhancing Green Agricultural Production through Nano Technology

(Soochow University, China)

1. Abstract

Nanotechnology is one of the most important tools in modern agriculture, and agri-food nanotechnology is anticipated to become a driving economic force in the near future, offering the potential for significantly enhanced agricultural productivity and efficiency with lower cost and less waste. Our group has been focused on this field for years and has already got a series of creative achievements. Here we are providing a full set of nano-technical application project. We will offer the technology to develop and produce bio-safe nanoparticles, help our partners to construct an agricultural application system, and hence to improve the quality and production of agri-food plants.

2. Organization Introduction

Kang group has 34 members, including two professors, three associate professors, two post-doctors, and 27 students. The research group has established nanomaterial design laboratory, synthesis laboratory, catalytic reaction laboratory and biological laboratory, including high-performance computing cluster system, transient photoelectric test system, super clean bench, plant light incubator and other experimental equipment, as well as a variety of materials characterization and analysis testing conditions. We mainly focuses on carbon and silicon quantum dots, clusters, metal/semiconductor nanoparticles, etc., and has developed five research areas: photocatalysis, electrocatalysis, photo-electrocatalysis, nano-biology and device areas.

3. Research Areas

In the research area of nano-biology, the optical properties and biological activities of carbon dots as well as their effects on crop growth were explored. The uptake, transportation and biodegradation of different types of carbon dots during the growth of crops (rice, wheat, corn, soybean, etc.) were systematically studied; its effects on seed germination, root activity, photosynthesis, crop yield and disease resistance of crops were investigated. Their specific mechanism in the process of crop growth was explained. The biosafety of the grain was also evaluated.

4. Open for Proposals until

Aug. 31, 2022

5. Opportunity Description

In our previous work, we have synthesized a series of 5 nm sized carbon dots (CDs) by a facile electrochemical approach which was developed by ourselves and have the full intellectual property. We employed these CDs as model material with which to explore the impact of carbon nanoparticles on agri-food plants. Systematic investigations provide insight into the different processes by which seed germination, root elongation, and

carbohydrate generation are increased. Meanwhile, CDs can enhance the plant disease resistance ability through inducing the expression of anti-disease genes. We also found that the surface oxygen-containing group content and the graphite structure of CDs were the crucial factors for increasing the plant disease resistance. This is in fact a revelation to us that carbon dots can be designed to meet different usages of agriculture applications. Additionally, the CDs degrade to form plant-hormone analogues and CO2; the hormone analogues promote the plant growth, while the CO2 is converted into carbohydrates through the Calvin cycle of photosynthesis. Furthermore, the CDs also can enhance the RuBisCO activity by 42%. The outcome of these processes is a 14.8% enhancement of the total rice yield. Our findings not only find an effective method on increasing the yield of rice and promoting the rice-plant disease resistance but also demonstrate how the biosafe CDs influence rice-plant growth and disease resistance in the whole rice life cycle. Also, we found that this effect can be extended to other plants such as corn, soybean, wheat, vegetables and horticultural plants.

We have designed and developed numerous CDs with specific functions such as RuBisCO enzyme activator, anti-bacteria and/or anti-fungus properties, nitrogen fixing enhancer, anti-insect properties, and so on. We have already built up a pilot scale production of these CDs. We have also developed a technology to instantly transfer functional genes using CDs as the DNA vector without any genetic consequences.

Here, we will export the production technology and application guidance to the partners of belt and road countries who are interested in enhancing the agricultural efficiency and productions.

6. Partners Contribution

A. We are trying to find research partners of institutes or companies who are willing to go further into the nanotechnology field with us. We will together work on developing new carbon dots which are suitable for local Agri-plants.

B. The partners should have the abilities or resources to build carbon dot production facilities, and can find suitable places or farms to put the application projects forwards.

7. LOOKING FOR...

Agricultural companies, Research institutes, agriculture related universities

High Efficiency and Ecological Value-added Treatment Technology for the Insect and Crack Prevention of Raw Bamboo

(Nanjing Forestry University, China)

1. Abstract

High-temperature steam treatment is used for effective modification of raw bamboo. After treatment, raw bamboo can be dried quickly without cracking. By the way, the insect prevention, anti-mold, anti-corrosion and dimensional stability of raw bamboo can be improved significantly. This technology has high treatment efficiency and has no pollution in the whole process. It will provide high-quality raw bamboo substrate for the production of high-grade bamboo products, prolong the service life of raw bamboo and expands its application field.

2. Organization Introduction

The bamboo engineering research center of Nanjing Forestry University is leading research and development institution for bamboo processing and application in the world. It has successively developed a series of bamboo-based products such as bamboo plywood for carriage floor, high-grade bamboo concrete formwork and outdoor bamboo scrimber. The developed bamboo-wood composite container floor has occupied more than 80% of the global container floor market and has more than 60 invention patents.

3. Research Areas

The research fields are mainly in a series of bamboo-based product development such as bamboo-wood composite container floor, outdoor bamboo scrimber, high-strength bamboo-based panel, ecological modification of raw bamboo, raw bamboo furniture and home decoration materials, bamboo architecture and outdoor landscape building, efficient extraction and application of bamboo vascular bundle fibers, etc. The developed raw bamboo can be used for indoor and outdoor decoration. The round bamboo tube does not crack, and the outdoor service life of raw bamboo can reach more than 20 years. The developed bamboo furniture and other bamboo products, which included the bamboo outer skin have a good surface wear-resistance without painting. Moreover, the beautiful appearance and structural firmness can reach the quality of the furniture made of Lobular red sandalwood.

4. Opportunity Description

The technology needs to be implemented in or near the bamboo areas. Processing enterprises should preferably have its own bamboo product production, and then make comprehensive utilization according to the needs of external customers and independent development of new products. This technology can be used for the treatment of raw bamboo with any species, size, and diameter. The round bamboo tube does not crack used indoor, and the outdoor service life of raw bamboo can reach more than 20 years. This technology is in the upstream high-quality raw material supply chain and the development of downstream products. We have used the thermal-treated raw bamboo for the scaffold of

a 15 hectare fruit and vegetable greenhouse, and also for manufacturing high-quality bamboo green furniture (raw bamboo with outer skin), which has the similar quality and firmness of mahogany furniture. The developed bamboo decoration products can be used not only for general decoration, but also for the artistic decoration of five-star hotel to meet the indoor and outdoor decoration. At the same time, we can also develop art decoration, bamboo crafts, and bamboo structure building.

The technology with high-tech content is an ecological modification method for bamboo without adding fungicides, pesticides and preservatives in the treatment process. Good dimensional stability and improved service life of raw bamboo after treatment, so as to improve the grade and broaden the application scope of bamboo products. The capital investment of this project is medium.

5. Country Focus

This technology needs to be implemented in regions and countries with bamboo growth, and ability to cooperate with customers in later application channels to develop high-quality bamboo products.

6. Partners Contribution

Partners should have their own bamboo products (bamboo furniture, bamboo crafts, etc.), and then develop new products according to the needs of external customers and independently to comprehensively utilize bamboo. Raw bamboo can also be sold after treatment. The factory preferably can provide high-temperature steam.

7. LOOKING FOR...

It is better to be a large-scale bamboo product production and sales enterprise, and also hope that enterprises with sales channels can develop high-quality bamboo products together. It can also be a partner with funds and interested in the application of high-quality bamboo products, or a national or provincial R & D center with bamboo resources but lack of product development.

Generation of Renewable Energy and Production of Valuable Carbon-based Products from Various Biomass Using a Novel Thermochemical Conversion Route

(Nanjing Forestry University, China)

1. Abstract

Biomass is not only one of the most abundant renewable energy resources, but also acting as the only green carbon-containing materials. Compared to the traditional biomass

combustion for energy and heat supply, it is critical to develop valuable carbon-based products from biomass in the long term. Currently, the pyrolysis and gasification technologies have been widely employed to produce gas, liquid (biofuel) and solid carbon (biochar). The biofuel and biochar are generally considered as the low-value products due to their complexity in nature and the lack of a clear physiochemical structure and function, resulting in their being used as combustion feedstocks. Therefore, it is necessary to develop a novel thermochemical conversion technology for directionally converting biomass into targeted compositions of liquid fuel and solid char, which will ease their subsequent upgrading process to obtain more highly valuable products, such as chemicals, electrodes and special fuels.

2. Organization Introduction

Nanjing Forestry University (NJFU) is a provincial key university co-administered by Jiangsu Provincial Government and the National Ministry of Education.

3. Research Areas

- Fundamental research on volatile-char interaction during the thermochemical conversion of biomass in various types of reactors in order to regulate the secondary reactions and the target product compositions.
- Based on the fundamental research, build a reactor system at a commercial scale and optimize operation parameters.
- Develop conversion methods by considering the difference in various types of biomass (e.g. agricultural and forestry biomass residues).
- Develop valuable end products from orientated biofuel and biochar.

4. Open for Proposals until

Dec. 30, 2023.

5. Opportunity Description

After years' efforts in developing technology for converting biomass into energy and carbon-based materials, we have successfully commercialized more than 10 industrial plants to convert biomass into electricity, heat, steam and biochar (or partially activated carbon) on a scale of 5-10 tons/hour. This kind of technology can be easily transferred.

To further develop a novel process to convert biomass into targeted liquid fuel and solid carbon (which can be then further converted into high-value chemicals, fuels and carbon-based functional materials, etc.), intensive research work is being conducted. Currently, a laboratory pilot-scale rig is under development based on our fundamental research results. We would like to look for research partners in this area.

6. Partners Contribution

Investment. Regarding our developed technology (see the first point in Item 5), we would like to collaborate potential industrial and/or governmental partners to export the technology including all the equipment to oversees.

Research and Investment. Regarding the developing technology (see the second point in Item 5), we would like to collaborate universities, research institutions and even industries to conduct further study using various typical biomass from different regions across the world, realizing the commercialization within 2-3 years.

7. LOOKING FOR...

- Governments
- Industries
- Universities/Research Institutions

Innovative Technology on Integrated Rice-fish Farming

(Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences, China)

1. Abstract

Integrated farming of rice and fish is a good way to maximize the economic benefit of the traditional rice growing. This technology will be focused on selection of paddy field for fish farming, design and engineering of rice-fish farming, fish species selection for rice-fish farming, rice planting, feeding management, disease prevention and treatment, harvesting, extension and demonstration of rice-fish farming technology, etc.

2. Organization Introduction

Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences (FFRC/CAFS), affiliated to Ministry of Agriculture and Rural Affairs (MARA), is a comprehensive institution for fishery research and development, combining together scientific research, training and education, technology extension and information exchange. It is the FAO Reference Centre on Inland Fisheries and Aquaculture Research and Training. Since 1981, over 5100 fishery officers and participants from 133 countries have been trained in FFRC and over 120 technical consultants from FFRC have been dispatched to over 50 developing countries for providing technical training, technical consultancy and technical extension. It has been awarded as “Special Contribution to South-South and Triangular Cooperation “by Ministry of Agriculture and Rural Affairs and FAO.

3. Research Areas

Bio-technologies, Genetics & Breeding, Fishery Environment Protection, Inland Fishery Resources Assessment & Stock Enhancement, Aquaculture, Veterinary, Feeds & Nutrition, and Fishery Economics and Information.

4. Open for Proposals until

Dec. 31, 2025

5. Opportunity Description

Ecological Opportunity: Rice-fish ecosystems make fully utilization of land and water resources. By reducing the usage of pesticides and chemical fertilizer, it not only reduced environment pollution, but also provide reliable food safety insurance. This environment friendly ecosystem has realized sustainable development for both agriculture and aquaculture.

Economic Opportunity: By the application of the technology, it is very easy for local farmers to increase incomes through the sale of fish and rice in an efficient way. In addition, introducing rice-fish system also is stimulant of promoting local tourism, which is another important part of economic benefits for local people.

Social Opportunity: By improving the output value of paddy, this ideal income had attracted more men staying at home and farming fish instead of leaving home far away to work in cities, which is of great significance for happy family and the social stability. With the increase of incomes, the social status of women could also be promoted. The more important thing is women could pay more attention of raising children, let children to get better school education.

6. Country Focus

Southeast Asia countries and some African countries

7. Partners Contribution

Assist to liaise local sections and language translation as needed;
Assist the task team to identify right project site and select farmers for project demonstrations;
Assist to identify the appropriate fish seed sources for stocking;
Follow up the project and continue to offer technical consultations;
Need to maximize the technical extension so as to exert a maximum impact in the communities and the country.

8. LOOKING FOR...

Institutions involved in fishery administration, research, technical extension, etc.

Innovative Technology on 'Breeding, Seed Production, Aquaculture Extension' of Tilapia

(Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences, China)

1. Abstract

Tilapia is a very popularly cultured species which is of high growth rate, less spine, high resistance to tough environments. The technology will be focused on selective breeding, artificial breeding and seed production, feed development, grow-out culture, feeding management, disease prevention and treatment, harvesting, technical extension and demonstration, marketing system and international trading, etc..

2. Organization Introduction

Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences (FFRC/CAFS), affiliated to Ministry of Agriculture and Rural Affairs (MARA), is a comprehensive institution for fishery research and development, combining together scientific research, training and education, technology extension and information exchange. It is the FAO Reference Centre on Inland Fisheries and Aquaculture Research and Training. Since 1981, over 5100 fishery officers and participants from 133 countries have been trained in FFRC and over 120 technical consultants from FFRC have been dispatched to over 50 developing countries for providing technical training, technical consultancy and technical extension. It has been awarded as "Special Contribution to South-South and Triangular Cooperation "by Ministry of Agriculture and Rural Affairs and FAO.

3. Research Areas

Bio-technologies, Genetics & Breeding, Fishery Environment Protection, Inland Fishery Resources Assessment & Stock Enhancement, Aquaculture, Veterinary, Feeds & Nutrition, and Fishery Economics and Information.

4. Open for Proposals until

Dec. 31, 2025

5. Opportunity Description

Ecological Opportunity: The technology will focus on establishing of new model of tilapia aquaculture, such as good tilapia strain (high growth rate, high disease resistance, etc),

good feed (low FCR, developed special for tilapia, etc), which will increase the production and achieve feed-saving, and make fully utilization of land resources and raw materials; and the new aquaculture model be developed is environment-friendly.

Economic Opportunity: By the application of the technology, it is very easy for local farmers to increase incomes through the increase of tilapia production. A complete chain for tilapia industry will be developed starting with breeding, ending with marketing, which will help decrease the cost to farmers.

Social Opportunity: By improving the output value of tilapia farming, this ideal income had attracted more men to stay at home and farm fish instead of leaving home far away to work in cities, which is of great significance for happy families and social stability. With the increase of incomes, the social status of women could also be promoted. The more important thing is women could pay more attention of raising children, let children to get better school education.

6. Country Focus

African countries and some Southeast Asia countries

7. Partners Contribution

Assist to liaise local sections and language translation as needed;
Assist the task team to identify right project site and well select the famers for the project demonstrations;
Assist to identify the appropriate tilapia seed sources for the stocking;
Follow up the project and continue to offer technical consultations;
Need to maximize the technical extension so as to exert a maximum impact in the communities and the country.

8. LOOKING FOR...

Institutions involved in Fishery administration, research, technical extension, etc.

Mycorrhizal Fungi as Potential Bio-Protectant against Biotic and Abiotic Stresses in Tropical Fruit Tree Production

(Thailand Institute of Scientific and Technological Research, Thailand)

1. Abstract

Arbuscular mycorrhizal (AM) fungi can colonize and establish symbiotic relationships with plant roots of most major plant families. Mycorrhizal symbioses normally enhance nutrient uptakes and protect plant hosts against biotic and abiotic stresses. Our studies in

durian which is one of the most popular tropical fruits in Thailand showed that mycorrhizal inoculation of some mycorrhiza species improved plant growth under greenhouse conditions. AM also improved drought stress tolerance and reduced disease severity of mycorrhized durian plants. However, one of obstacles for commercial application of AM is optimization of large-scale production. Technologies for reproduction of fungal propagules and formulation are necessary to enable commercial uses of AM in durian plantations and other tropical fruit tree species.

2. Organization Introduction

Thailand Institute of Scientific and Technological Research (TISTR) is a state enterprise that has missions on the conduct of research, technology transfer, industrial services and creation of innovation under the Ministry of Higher Education, Science, Research and Innovation (MHESI). It is a leading agency in Thailand with excellent potential in research and development, technology transfer and provision of science and technology (S&T) services. With more than 500 quality researchers and experience in various fields as well as 57 years of establishment, TISTR have been conducting more than 2,000 research and development projects in different subjects, knowledge and technologies.

3. Research Areas

Mycorrhiza

4. Open for Proposals until:

Open ended

5. Opportunity Description

I am interested in beneficial microorganisms for sustainable agriculture especially those that play a role in plant productivity and plant protection from various stresses. Our research group has started our experiments with mycorrhizae in durian and our results showed that mycorrhiza application provided promising biostimulant and bioprotectant activities under greenhouse conditions. Currently, we are seeking for funding for our next phase research focusing on field experiment and application in other fruit crop species. One of the bottlenecks of our research is large-scale production of mycorrhiza propagules as the obligate symbiotic behavior makes this step very challenging. We are looking for experienced international research partners to develop mass production technologies for commercial use.

6. Partners Contribution

Develop technologies for mass production and formulation.

7. LOOKING FOR...

Research institute or university with experienced researchers or technical experts in the field of mycorrhiza research.

Sustainable Farming under Climate Change

(The Royal Scientific Society, Jordan)

1. Abstract

Future climate projections indicate a reduction in precipitation and an increase in temperature, with an adverse impact on farming. Right varieties of crops resilient to the future climatic conditions are important for sustainable farming. Using data from high resolution climate models and climate analog approach, resilient types of crops and useful farming practices can be identified and shared.

2. Organization Introduction

The Royal Scientific Society (RSS) is an independent non-governmental, not-for-profit multidisciplinary science institution established by Royal Charter. Founded in 1970 as a national organization to actively advise and support the development of Jordan with sound technical and policy advice, and consultations. The RSS undertakes specialized and accredited testing, research work with local industries and universities, consultations for the private and public sectors, and works in partnership with regional and international organizations. Since its inception as a national and independent organization, the prime objectives of the RSS have been to protect human health and safety, to safeguard the environment, and to contribute to sustainable economic development.

3. Research Areas

Agriculture, Information and Communication technology, Water

4. Open for Proposals until

Open ended

5. Opportunity Description

Future climate projections indicate a general reduction in precipitation and an increase in temperature in the MENA region and other regions in the world, with an adverse impact on farming.

Choosing the right varieties of crops which can be resilient to future climatic conditions is important for sustainable farming. The WCRP Coordinated Regional Climate

Downscaling Experiment CORDEX programme has provided a wealth of regional climate model simulations in 14 regional domains. These simulations can be used to derive projections for future variations in climatic conditions (temperature, precipitation, etc..). These projections can be used to determine the suitability of current crops, planted in the selected region, to future variations in the climatic conditions through the use of crop models. Additionally, the climate analog approach will be used, where projected climatic conditions for a selected region can be matched to current climatic conditions in another region of the world, leading to the identification of suitable farming practices and more resilient crops. The data and knowledge gained in this project will be made available to farmers on a digital platform and through appropriate communication channels.

The RSS has experience in the following fields:
- Validation and analysis of both global and regional climate models (e.g. CORDEX) simulations.
- The use of crop models for a number of crops planted in Jordan.
- Experience in creating digital tools and solutions.

6. Partners contribution:

We would like to work with partners who expect to be impacted by climate change in a similar manner to that in Jordan, particularly in the MENA region, or in arid and semi-arid region. Partners could have similar expertise to our experience, but intend to implement the idea for their own country. So, we can pool our resources together, and share the responsibility of the tasks in a productive way, particularly if they come from the MENA region.

7. LOOKING FOR:

Research organization/institute, university

Solar-Powered Pumping in Jordan Valley and the Highlands

(The Royal Scientific Society, Jordan)

1. Abstract

The main challenges that confront Jordan in regards to the energy stance are the increasing energy demand and the limited domestic resources. Jordan does not produce fossil fuels; it relies on importing more than 97% of its total energy needs. Additionally, recent political developments in the surrounding regions have put further challenges on the sector and caused this energy crisis to deepen. Jordan has been facing a convergence of supply disruptions of energy imports from Egypt, alongside rising local demands in Jordan owing

to a large influx of Syrian refugees and forced migrants. While not a primary driver of systemic energy sector challenges in Jordan, the Syrian crisis is a significant exacerbating factor. Rising energy costs also contribute towards decreased fiscal space available to respond to overall development challenges.

This situation caused the need to evaluate the diversification of sources used to produce electricity, so to assure the security of supply, renewable energy was one of the most viable options that were discussed in the National Energy Strategy 2007-2020. The strategy includes targets to increase the contribution of renewable energy sources to the national energy supply. The share of renewable energy in the total energy mix was planned to reach 7% by 2015 and 10% by 2020.

2. Organization Introduction

The Royal Scientific Society (RSS) is an independent non-governmental, not-for-profit multidisciplinary science institution established by Royal Charter. Founded in 1970 as a national organization to actively advise and support the development of Jordan with sound technical and policy advice, and consultations. The RSS undertakes specialized and accredited testing, research work with local industries and universities, consultations for the private and public sectors, and works in partnership with regional and international organisations. Since its inception as a national and independent organisation, the prime objectives of the RSS have been to protect human health and safety, to safeguard the environment, and to contribute to sustainable economic development.

3. Research Areas

Green Developments in Agricultural Sector

4. Open for Proposals until:

Open ended

5. Opportunity Description

Jordan is a developing country which has been always facing water scarcity, which is accompanied by many other issues such as socio-economic changes, water management, slow economic growth and unemployment. The usual approach in Jordan, is to tackle these problems by introducing new regulations, measures and incentives to reduce the consequences of such issues, however, such approach is no longer applicable to deal with a multidimensional problem, which the solution is required to address them.

The PV pumping project is focused on climate change mitigation, in which the project has assessed the farmer needs, engaging local communities in decision making, supporting and encouraging farmers to use clean energies, spread awareness of energy and water management and improvement of their livelihood, all in the framework of mitigating

climate change impact. This project has adopted a bottom approach to determine and define measures needed to be implemented in reality.

6. Country Focus

All countries

7. Partners Contribution

Technical and financial support.

8. LOOKING FOR...

CleanTech Developers and Funding Agencies.

High-yield Pulping of Palm Empty Fruit Bunches for Production of High-strength Packaging Paper and Paperboard

(Institute of Chemical Industry of Forest Products, Chinese Academy of Forestry, China)

1. Abstract

In the past 20 years, palm oil production is shown with sustained and steady growth. The palm oil production of Malaysia and Indonesia accounts the portion more than 86% of the world's total palm oil production. Tens of millions of tons of palm fruit bunches are disposed of using incineration and landfilling every year, resulting in environmental pollution and a waste of fibrous resources. Making high-yield pulp from empty palm fruit bunches not only reduces the pollution but also alleviates a shortage of fiber raw materials in the local paper industry. Production of high strength corrugated medium and high-grade liner-board can meet the strong demand for packaging materials in the local industry, agriculture and e-commerce economy.

2. Organization Introduction

Established in July 1960, Institute of Chemical Industry of Forest Products (ICIFP) is the only national comprehensive research institution in China that specializes in the chemical processing and utilization of wood and non-wood biomass resources with research and technology development as well as engineering design capability. ICIFP has obtained 644 national, ministerial, and provincial level projects, 24 national awards, 75 ministerial and provincial awards, and more than 300 authorized patents since its inception. The research areas at ICIFP include pulp and paper, biomass energy, biomass chemicals and materials, plant extracts, forest/paper integration and process equipment. The research achievements from ICIFP benefited thousands of enterprises across the country with production value

over tens of billions of yuan. High-yield wood pulping technology from ICIFP has been applied successfully in more than 40 production lines at 16 factories around China.

3. Research Areas

Agriculture, forestry, paper industry, chemical industry of forest products

4. Opportunity Description

(1) Main technical merits:

① The maximum utilization of fiber resources has been realized. By using the lignin-preserving pulping processes, a high pulp yield of 75% ~ 88 % is obtained, which is one time higher than the traditional chemical pulping process;

② The pulping adopts a mechanical pulping method so that the amount of NaOH for auxiliary chemical impregnation is very low (3%~5%) , which is only 1/5~1/8 of traditional chemical pulping process;

③ The water usage per ton of pulp is $15m^3$ or less, which is 1/3 of the traditional chemical pulping process;

④ The amount of pollution is only 1/5~1/4 of the traditional chemical pulping process, and the effluent can reach the direct discharge limit after secondary and advanced treatment with minimal impact on the surrounding environment;

⑤The equipment investment is only 1/8 of that of traditional chemical pulping, and the production line flow is compact and flexible.

(2) Main outcome indicators:

The production line utilizes 356,000 tons of empty palm fruit bunches (30% dryness) and 24,000 tons of American Old Corrugated Container (AOCC) annually to produce 100,000 tons of high-strength corrugated paper. The effluent meets local discharge standards.

(3) Comprehensive benefits of technology

This project can meet the local development needs by beneficial use of agricultural waste and other biomass resources. With the establishment of this project, the annual use of waste palm fruit bunch resources will reduce the negative impact of improper disposal on the environment and will greatly increase farmers' income, improving rural and regional environmental protection. Pulp and paper products can also enhance market competitiveness, increase national taxation and local fiscal revenue, and have good social benefits and significant economic benefits.

(4) Proof of technology maturity

The project technology is mature and reliable: there are over 10 commercial production line built in China and one built in Malaysia (50000 t / a of high-strength corrugated paper). The core technology and equipment have been exported to Egypt, North Korea, the United States and other countries, and have been applied in more than 40 domestic production line upgrading projects.

(5) Technical applicability

The project technology and equipment are suitable for the economic development needs of major oil palm producing countries in Southeast Asia such as Indonesia and Malaysia. It can beneficially dispose of nearly 80 million tons of empty palm fruit bunches every year and reduce environmental pollution caused by improper disposal of agricultural waste. At the same time, it meets the rapidly increasing demand for paper and cardboard packaging materials.

Project delivery can be in the form of turnkey project. The technology provider can provide professional training for local technicians and workers with detailed instruction on production operations.

(6) Technical safety

There is minimal risk of secondary pollution, leakage of flammable, explosive and highly toxic substances, or other environmental and safety accidents. The fiber resources used are agricultural wastes with sufficient supplies. The project has achieved reliable control from raw material pretreatment to final product delivery. Paper and paperboard products are under supply shortage and the sales price is rising steadily for 10 years. Since the production line has requirements for power matching, location with sufficient power supply is expected with better economic benefits.

(7) Investment payback estimation

100,000 ton per annum high-yield palm fruit bunches pulp and high-strength corrugated paper production line has an estimated annual capital investment and operation cost of 239 million CNY. With an annual sale income of 350 million yuan, the estimated initial investment payback period is 3.2 years.

(8) Additional benefits

One 100000 t / a production line is expected to bring 400 new jobs, of which 50 are management/technical jobs and 350 are production or auxiliary jobs. Local farmers can expect a total income of 40 million yuan from the sale of palm fruit bunches (300 Yuan / t calculation, 100% dryness). Construction of the project will be a positive role model addressing the agricultural waste disposal problem with commendable social, economic and environmental benefits.

5. Country Focus

Major producers of oil palm in Southeast Asia such as Indonesia and Malaysia

6. Partners Contribution

Choose production line location, secure raw material and investment

7. LOOKING FOR...

Business owner, investor, local authorities

Hydrogenation and Isomerization of Triglycerides to Produce Low Cold Filter Point Green Diesel

(Institute of Chemical Industry of Forest Products, Chinese Academy of Forestry, China)

1. Abstract

Plant oil conversion into green diesel has greatly potential as substitutes for petroleum and its derivatives. Such feedstocks can be effectively deoxygenated through decarboxylation, decarbonylation and hydrodeoxygenation pathways to produce green diesel by using NiMo-based catalyst. After that, the long-carbon-chain paraffins were isomerized by the SAPO-based noble-metal catalyst can obtained amount of iso-paraffins, dramatically decreased the cold filter point below -20 ℃. Triglycerides can convert into high cetane number, low density and stable biodiesel, which can be used in engines without any further processing.

2. Organization Introduction

The Institute of Chemical Industry of Forest Products, Chinese Academy of Forestry (hereinafter referred to as the Institute of Forest Chemistry) is the only national-level institute in China that specializes in the chemical processing and utilization of wood and non-wood biomass resources, integrating basic research, applied research, product development and engineering design, and was established in July 1960.

3. Research Areas

The main research areas include biomass energy, biomass chemical, biomass new material, biomass natural product, wood pulping and papermaking integration, resin chemical utilization and fine processing, chemistry and engineering of activated carbon, plant tannin and forest resource chemical utilization, forest product chemical engineering equipment research.

4. Open for Proposals until

Dec. 2023

5. Opportunity Description

Biodiesel global output is about 40 million tons. Currently, the most effective of biodiesel production method is hydrodeoxygenation of the triglycerides, which is typically carried out at 350-450℃ under H_2 pressure of 4-15MPa by using the heterogeneous catalysts. Such heterogeneous catalysts are based on desulfurization catalysts with active components such as Ni, Co, Mo, W etc. and triglyceride raw materials such as soybean oil, waste cooking oil and acidic oil with high unsaturated carbon chain. Usually, the unsaturated triglycerides are first hydrogenated to form saturated triglycerides. Then, the

carboxylic acid group can be further deoxygenated under the synergy of carrier and active center to yield long-carbon-chain paraffin. Oxygen can be removed through three deoxygenation pathways, including decarboxylation, decarbonylation and hydrodeoxygenation. At present, the yield of paraffin can reach up to 82%, the high deoxidation effect endowing the biodiesel with the good physiochemical properties.

However, many traditional companies have isomerized the paraffin product to obtain isoparaffins to improve the value of biodiesel. In terms of isomerization catalysts, noble metal-based bifunctional catalysts supported by acidic show good selectivity for isoparaffins. After that, biodiesel content highly isoparaffins can dramatically decreased the cold filter point. Thus, the low cold filter point biodiesel can be directly used in engines even in cold plateau areas. Furthermore, isomerized biodiesel has two other characteristics, including high cetane number and low density, significantly improving its combustion performance and economic competitiveness.

At present, our technology is focused on the modification of hydrodeoxygenation and isomerization catalysts and research into their corresponding application to triglyceride conversion. The modified NiMo hydrodeoxygenation catalyst can effectively deoxygenate the carboxylic group at a temperature of 270 ℃, and the pilot-scale (1000t/a) reaction also demonstrates the feasibility of industrial production. On the other hand, enhancing the isomerization of long carbon chain paraffins by modifying the pore size of SAPO molecular sieve. The cold filter point of final biodiesel product can blow to -20 ℃. And our researches further improving the conversion efficiency and energy consumption.

6. Country Focus

Asia, Africa, South America…

7. Partners Contribution

(1) Abundant raw material supply, including palm oil, fatty acids, waste cooking oil etc.
(2) Established hydrogenation equipment and manufacture plant.

8. LOOKING FOR...

Looking for companies and research institutes for applying green diesel technology.

II. ENVIRONMENTAL PROTECTION

Clean High-performance Natural-gas Engine Technology for Vehicle and Off-road Applications

(Smapow Engine Company, China)

1. Abstract

Natural gas is abundant in most countries in the "One Belt and One Road" regions. This technology can be used in these countries to produce engines fueled with clean and cheap natural gas for application in passenger cars, light trucks and off-road power generation. The technology is technically advantageous and economically competitive. The technology meets China 6b emissions standard, and provides excellent fuel economy and power output. It has been commercialized in China since 2017.

2. Organization Introduction

Smapow Engine Company is a high-tech enterprise which is devoted to research, manufacturing and application of high-performance natural-gas internal combustion engines with ultra-low emissions for vehicle and off-road applications. The products range from 1.2L to 2.4L with naturally-aspirated and turbo-charging variants. The company is located in Huai'an City of Jiangsu Province in China, two-hour away from Shanghai by hi-speed train.

3. Research Areas

Manufacturing, Vehicle, Power Generation, Clean Energy

4. Opportunity Description

1) To provide engine products to local vehicle companies so that they can produce natural gas vehicles. The engine products range from 1.2L to 2.4L with naturally-aspirated and turbo-charging variants. The vehicles can be passenger cars, pick-ups, small and medium buses and light-duty trucks.

2) To provide natural-gas engine powered generators to the local markets;

3) To form JVs with local partner(s) to produce engines locally, or to transfer the technology of the engine products and manufacture lines to local partner(s).

5. Country Focus

Iran, Russia

6. Partners Contribution

Local marketing and sales; collaboration on natural-gas vehicle development

7. LOOKING FOR...

Car manufacturing companies, truck/bus manufacturing companies, or power generator distributors, local investors

Smart Portable Perma

(Sultan Idris Education University, Malaysia)

1. Abstract

Food waste is a crucial issue in our society. According to The Solid Waste and Public Cleansing Management Corporation (SWCorp) of Malaysia, Malaysians produces about 16,688 tonnes of food waste per day, an amount that can easily feed up to 2.2 million people, three meals a day. According to statistics, 60% of the Municipal solid waste (MSW) generated in Malaysia constituted food waste, including fruits and vegetables. By implementing the concept of Permaculture together with 5R by Zero Waste, the innovative product; Smart Portable Perma (SPP) was designed to tackle those issues. The successful key to SPP is layering within the main pot. The composting layer (upper layer) consists of brown waste, green waste and soil, which will produce compost. The lower layer, filtering layer (containing pebbles, twigs, coconut husk and coco peat) will provide efficient water irrigation, produce a good water soil with a high concentration of essential nutrients, and increase the soil holding capacity. Small vegetative and herbs can be planted in the portable pot, which acquires nutrients from the compost and good waste soil provided by the main pot. Thus, this product can perform two essential activities: compost maker and planting kit.

2. Organization Introduction

Sultan Idris Education University (Malay: University Pendidikan Sultan Idris) is a public university in the town of Tanjung Malim, Perak in Malaysia. First established in 1922 as a teachers college, it is one of the oldest functioning institutions of higher learning in Malaysia.

3. Research Areas

- Agriculture

- Waste management and environment

4. Open for Proposals until:

Oct. 31, 2021

5. Opportunity Description

Malaysians generate approximately 16,688 tonnes of food waste every day, enough to provide nearly 2.2 million people with three full meals daily (SWCorp, 2019). On the other hand, the problem becomes more crucial when stocking-up phenomena happen during a pandemic that led to agricultural and food waste. The purchases were mainly perishable items such as vegetables, fruits, eggs, amongst other dry food and frozen food. This issue has raised a concern toward food waste management in society. The campaign for Reuse, Recycle and Reduce has been hardly achieved in the agriculture waste context. Depending on the quality of the waste itself, each sort of agricultural waste has its purpose. Thus, using this innovation, we are focusing on tackling food waste management issues and promoting consumers toward agricultural activity.

Smart Portable Perma (SPP) is an innovative product that applied the 5th (use and value renewables) and 6th (produce no waste) principles permaculture concept together with 5R (Refuse, Reduce, Reuse, Recycle, and Rot). The permaculture principles allow us to create a culture that can endure and thrive for generations to come. At the same time, 5R will enable us to reduce the food waste by turning them into compost which is beneficial for plants as the organic fertilizer. The successful key to this product is layering. The lower layer - Filtering layer, provides efficient water irrigation, produces good water soil with a high concentration of essential nutrients and increases the soil holding capacity. The upper layer - Composting layer, consists of brown waste, green waste and soil, which will decompose to produce compost. Thus, two essential activities that can be performed using this product are compost maker and mini agriculture.

This product targeted people who face problems in food waste management in their household, particularly in urban areas such as high rise residential, interested in agriculture and zero waste green technology. Smart Portable Perma is a home kit that aims to perform two essential activities: compost maker and planting. SPP is an excellent way to opt-out waste and optimizes compost usage in agricultural activities. A special emphasis of this kit will be on the intelligence of technology embedded for automatic wastewater circulation systems and LED light sources with high efficiency and energy saving for shortening the growth cycle of plants. This product will effectively avoid the soil pesticide residues and heavy metals exceeding the standard, breeding diseases, insect pests and bacteria in the soil, and other drawbacks. Also, it will be equipped with indoor planting to promote air humidity, mature vegetables to purify the air, beautiful appearance can be decorative objects, all the year-round uninterrupted planting.

6. Country Focus

Asian and European Country

7. Partners Contribution

Targeting partners in 3-dimensional printing and plastic manufacturing company. Also, looking forward for intelligent of technology on smartphone controlling program.

8. LOOKING FOR...

Material and manufacturing organization

Zero Liquid Discharge and Resource Regeneration Tech based on Nano Functional Material

(Jiangsu Helper Functional Material, China)

1. Abstract

ZLD solution is based on advanced adsorption technology with nano adsorbents, combined with ultra-filter, RO, MVR evaporation, called DEEP ™ processing.

Advanced adsorbents grew from porous polystyrene resin, experienced fine regulation of pore size, functional modification and surface modification. It can present high performance on the COD reduction, color chroma adjustment and heavy metal removal.

Advanced adsorbents, Nano hybrid tech, continuous ion exchange system and DEEP processing are contributed to this ZLD solution.

2. Orgnazition Introduction

Jiangsu Helper Functional Material started in 2013, and has paid more attention on the advanced material research and development of high efficiency Nano hybrid adsorbents and providing related purification solutions. Advanced adsorbents and treatment solutions had covered coal chemical, biochemical, dyeing, electroplating, lithium extraction, agrochemical etc. Won numerous national awards by 40 patents and core lab team.

3. Research Areas

Mainly used for advanced wastewater treatment and resource regeneration to heavy water consumption, such as coal chemical industry, printing & dyeing plant and surface treatment.

4. Opportunity Description

ZLD solution applied to advanced wastewater treatment and resource regeneration of heavy water consumption, such as coal chemical industry, printing & dyeing plant and surface treatment.

ZLD involves advanced adsorbents, nano hybrid technology, continuous ion exchange system and DEEP tech.

1) Advanced adsorbents (fine regulation of pore size, functional modification)

Modified pore size is 6-8nm, and micro porous and mesoporous contribute over 90% specific surface area. This size can permit rapid diffusion and adsorption of organics in biochemical tail water. High efficiency decolorization and heavy metal removing can be achieved through functional modification.

2) Nano hybrid Technology

With abundant nano-pores of adsorbents, hybridize high active nano-ionic hydrate zirconia into nano pores, through impregnation and enrichment of zirconium oxide of precursor of inorganic nano-ionic, in-situ precipitation and activation etc.

This hybridization technology ensures the high dispersion of nanoparticles, inhibits the loss of nanoparticles by polymer chains cross-linking, and contributes to its high activity and stability. Hybridized adsorbents can remove common inorganic waste, such as phosphorus fluorine in surface treatment lines.

3) Continuous ion exchange system

This flow can reduce the usage of adsorbents, chemical material and elution agents. Compacted system design reduces the onsite operation area, simple to operate and control.

4) DEEP solution (ultra-filter advanced adsorption, RO, MVR evaporation)

The core of this process is using HELPER ADSORBENTS to remove COD, heavy metal, phosphorus, fluorine of biochemical tail water. Not only protects the reverse osmosis film, minimizes film unit cleaning, reduces operation cost, increases RO water production rate to 70%, and then processes salt extraction by evaporation and achieves zero discharge.

5. Partners Contribution

We are looking for partners who need waste treatment solutions and material, also seeking for sales reps who have experience in waste treatment with the goal being to help customers to improve their waste management together.

Skid-mounted Open-type Garbage Sorting Complex - High-End Environmentally-friendly Integrated Equipment for Waste Recycling in Agriculture, Forestry and Animal Husbandry

(Suzhou ECOLORD Environmental Protection Technology Co., Ltd., China)

1. Abstract：

The skid-mounted open-type garbage sorting complex can process 30-100 tons of agricultural, forestry and animal husbandry wastes per day. It features near-zero emission, no secondary pollution, negative carbon emission, energy recovery and resource recycling, and provides a "better, faster, and more economical" way for the recycling of agricultural, forestry and animal husbandry wastes.

2. Organization Introduction

Suzhou ECOLORD Environmental Protection Technology Co., Ltd. is a high-tech enterprise dedicated to the fields of ecological environment, energy conservation and environmental protection. Based on odor pollution control technologies, the company advocates industrial source revolution, and has formed an industrial alliance centered on investment, construction, and operation of a waste sorting and recycling complex.

3. Research Areas

Agriculture, forestry and animal husbandry & recycling

4. Open for Proposals until

Dec 31, 2025

5. Opportunity Description

Agricultural, forestry and animal husbandry wastes are the general term for emissions from the production, processing or utilization of agriculture, forestry and animal husbandry, mainly including straw, livestock and poultry manure, leftovers, and bark. Due to the wastes' wide variety, large output, and dispersion, there are few technical approaches for large-scale effective utilization, and the problem of waste and incineration is very serious. Amid the advancement of circular economy and energy saving and emission reduction, the recycling of agricultural, forestry and animal husbandry wastes has attracted more and more attention.

Technical approaches that address the bottleneck of efficient resource utilization of agricultural, forestry and animal husbandry wastes are on the horizon. After more than 30 years of technical reserves, our team has explored an epoch-making advanced iterative technology concept of the "waste sorting complex" through unlimited research on the ideas, technologies and equipment of comprehensive waste treatment at home and abroad. Based on the 16-character policy of waste sorting (one sorting and three changes, two classifications and two cores, separation and combination, and material-based cycle), the waste sorting complex solution can be summarized as: waste sorting complex = waste mechanical sorting + wet waste combined batcher (fermentation) + dry waste pyrolysis

and gasification. In particular, through the implementation of the waste classification complex model, we have realized the local circulation of gas, thermoelectricity, organic fertilizer, chemical products (detergent, etc.) and reclaimed water to benefit the local residents.

According to the status quo of agricultural, forestry and animal husbandry wastes, and based on the technical characteristics of the "waste sorting complex", we adjusted planning, design, facilities and production, and proposed a skid-mounted open-type waste sorting complex solution. It features high automation, modularization and integration, supply cycle as short as 2 months, low cost and operation cost, high resource utilization, no secondary pollution (such as dioxin), and near zero emission (the total carbon emission is 1/7-1/10 of the waste incineration disposal mode). Based on these characteristics, the innovative skid-mounted open-type equipment will provide a "better, faster, and more economical" way for the recycling of agricultural, forestry and animal husbandry wastes.

The skid-mounted open-type garbage sorting complex has broad development prospects. Due to China's vast territory, there will be no less than 10,000 application scenarios for the recycling of agricultural, forestry and animal husbandry wastes.

6. Partners Contribution

We expect various project cooperation with investment institutions, environmental protection groups, large enterprises, and industry-university-research institutions to achieve win-win results. At the same time, we hope that our partners will provide sufficient financial support to ensure the project success, so as to promote the production and manufacturing of the skid-mounted open-type waste sorting complex.

7. LOOKING FOR...

Investment institutions, environmental protection groups, large enterprises, industry-university-research institutions

Intelligent Sorting Technology for Domestic Solid Waste

(China Tianying Inc., China)

1. Abstract

The Intelligent Sorting Technology for Domestic Solid Waste focuses on the separation of recyclables from domestic solid waste streams. As a supplementary technology to waste treatment plants, it can improve the quality of input material of Waste-to-Energy incineration plants and organic waste biotreatment plants, at the same time collecting the remaining valuables from the waste stream. As a consequence, user will receive a better economic efficiency, as well as achievement of higher environmental benefits. Compared to manual sorting, this technology is 6 to 8 times more efficient.

2. Organization Introduction

China Tianying Inc. (sz.000035) is a listed international company engaged in urban services, end treatment and recycling of waste. Its main business model centers on the investment, construction, operation and maintenance of municipal environmental infrastructure projects, as well as the research and development, production and sales of environmental protection equipment. Its businesses range from Waste-to-Energy power generation, industrial robot manufacturing, domestic waste sorting and recycling, treatment of sludge, waste water, kitchen waste, hazardous waste, construction and demolition waste to landfill biogas development as well as investment and operation of waste classification and collection infrastructure.

3. Research Areas

Domestic solid waste recycling

4. Opportunity description

Intelligent Sorting Technology of Domestic Solid Waste embeds robotic sorting and AI into traditional sorting technology, which results in a higher recycling rate and efficiency. This technology is able to reduce the waste of recyclables from waste stream, and at the same time, facilitate the reuse and valorization of recycled material.

(1) Components

This technology consists of 6 subsystems: Unloading and Pre-Treatment System, Mechanical Sorting System, Magnetic Sorting System, Intelligent Sorting System, Quality Control System, and Baling System. The major feature of this technology is the combination of optical sorter and sorting robots, which improves the efficiency and sorting accuracy. The description of subsystems is listed below:

Unloading and Pre-Treatment System: This system consists of unloading and pre-treatment platform. In this subsystem, wrapping and bulky material are manually removed from the waste stream and eventually protect the following subsystems.

Mechanical Sorting System: This system consists of trommel, ballistic separator and wind separator. The trommel separates materials based on its mesh size. Ballistic separator separates material based on its shape. Input material can be sorted into 2D materials (plastic film, paper, cardboards) and 3D materials (container, bottle, can). The wind separator removes plastic films and papers from heavier materials.

Magnetic Sorting System: This system consists of magnetic separator and eddy current separator. Magnetic separator removes ferrous metals from the waste stream, followed by the eddy current separator, which removes non-ferrous metals.

Intelligent Sorting System: This system involves multiple sorting robots, which pick recyclables from waste stream. The recyclables being selected are categorized into 6 macro-types (plastics, metals, fabrics, glass, paper and WEEE) and further into multiple subtypes, based on the materials and colors designated by the user. The sorting accuracy can be as high as 95%.

Quality Control System: This system consists of quality control robots. Domestic solid

waste can be diverted into this system after all the sorting mentioned above. The quality control robots selected the unsorted recyclables from the waste stream, driven by the image and material recognition. This process further improves the recycling rate.

Baling System: This system involves multiple types of baler. All the material selected from the sorting process is diverted into designated baler, then being compressed and baled, and ready for transport.

The main feature of this technology is the accuracy of sorting (90%+) and 24-hour working hours. One single sorting robot employed in this technology can replace 6-8 operators. For a 200 ton/day treatment plant, the entire system can reduce at least 10 operators compared to manual sorting. The absence of on-site worker is especially critical during COVID-19 pandemic periods.

(2) Economy

Taking an example of a sorting facility with 150 tons/day treatment, while the input material is designed to be the solid waste that is prepared for WtE incineration plant.

Cost:

- Total upfront cost: roughly 7.47 million USD
- Annual operation cost: 1.81 million USD

Income:

Every ton of solid waste treated: 57 USD ($26 from electricity generated from improved incineration, $31 from recovery of recyclables). This means annual income is 2.83 million USD.

Payback Period: 7.47 / (2.83 – 1.81) = 7.34 years

Please note that the upfront cost varies from the actually equipment and technology being used. The annual income and operation cost are calculated based on the facility located in China and subject to change by location.

5. Partners contribution

Local domestic solid waste recyclers, Waste-to-Energy incineration plant operator or investor.

6. LOOKING FOR...

Local governments or environmental service companies.

Unit Modular Large-scale Municipal Solid Waste Incinerator

(China Tianying Inc., China)

1. Abstract

This technological achievement introduces the unit modular large-scale Municipal Solid Waste incinerator system, through the process of waste combustion, the waste volume can be reduced by 95%, and the waste weight can be reduced by 80%. In the combustion chamber the hazardous substances will be decomposed effectively at the temperature above 850℃, meanwhile the high-temperature flue gas produced will flow into the boiler (Heat Recovery Steam Generator), and heat the feed water into the superheated steam, and the steam is fed into the turbine to generate electricity. Then the residue ash is treated by ash treatment system, and the flue gas is cleaned by the Flue gas cleaning system respectively, it will eventually realize the waste 3R (Reduce, reuse, recycle) treatment.

2. Organization Introduction

China Tianying Inc. (stock code: 000035) is a listed international company engaged in urban services, end treatment and recycling of waste. Its main business model centers on the investment, construction, operation and maintenance of municipal environmental infrastructure projects, as well as the research and development, production and sales of environmental protection equipment. Its businesses range from waste-to-energy power generation, treatment of sludge, wastewater, kitchen waste, hazardous waste, construction and demolition waste to land fill biogas development as well as investment and operation of waste classification and collection infrastructure. CNTY has been dedicated to building an entire waste management industry chain that integrates waste classification, collection, transfer and end treatment.

3. Research Areas

This technology is mainly used for the recycling and harmless treatment of Municipal Solid Waste.

4. Opportunity Description

Advantageous features:

(1) The incinerator of this technology is provided with a sufficient drop at the boundary of each grate section to make the garbage turn over efficiently, and the vertical drop between the drying section, the combustion section and the burning up section is between 0.5-0.8 meters. The waste is fallen by the drop to improve the mixing and mixing effect of waste to realize the stable combustion of low calorific value and high moisture waste.

(2) The grate structure of the modular unit, it's a convenient design to increase or decrease the number of module groups according to the amount of waste treatment. Most parts get the same structure, fewer parts, good interchangeability and high expansibility. Effectively reduce the manufacturing maintenance cost, greatly improve the design efficiency and workshop manufacturing speed. Also, the modular structure of the furnace section facilitates road transportation, and can be fully assembled in the workshop, and improves the accuracy of on-site installation.

(3) The furnace walls on both sides of the incinerator adopt air-cooled wall structure, and the cooling air on each side of the furnace wall is divided into independent areas. The cooling air volume of the furnace wall in each area can be flexibly adjusted according to

the temperature of the hot air in each section, so as to ensure the uniform heat transfer in each area, effectively reduce the temperature of the furnace wall, avoid the surface of the furnace wall flying ash coking, and ensure the long-term and stable operation of the incinerator.

Solved Key Issues:

(1) The special connection design between the Grate tiles, there is no gap between the basic no gap on thermal expansion grate tiles, Waste will not sift out from the adjacent grate, greatly reduce the sifting falling phenomenon, reduce the thermal burn reduction rate.

(2) The front of the grate is set with the flexible wear-resistant scraper, and a gap is left between the scraper and the scraper slot, so that the primary air supply is uniform and keep waste combustion stable. Additionally, the back surface of the grate tile adopts fin structure, which increases the heat transfer area, improves the cooling effect of the grate, reduces the local damage, and effectively prolongs the service life of the grate.

(3) The grate tiles are made in unified specifications, all grate only one specification, strong interchangeability. In the normal operation process, the combustion section, drying section, burn-out section of the grate, three section of the grate can be flexibly exchanged according to the circumstance, greatly reducing the q'ty of spare parts, reduce the grate replacement rate and maintenance costs.

5. Country Focus

Europe, South Asia

6. Partners Contribution

Environmental protection Company, especially engaged in the incineration of domestic waste company.

7. LOOKING FOR...

We hope to find enterprises engaged in MSW incineration and know whether they are willing to use our technology to treat MSW.

Plasma Melting Technology for Disposal of Municipal Waste Incineration Fly Ash

(Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd., China)

1. Abstract

This technology adopts high temperature plasma melting technology to realize harmless reduction and resource disposal of MSW incineration fly ash.

2. Organization Introduction

Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd was founded in

2010, and is the main subsidiary of China Tianying Inc. (stock code: 000035). The main business of the company is researching, developing and manufacturing flue gas treatment equipment, waste incinerator, plasma equipment and so on. The company was identified as a Jiangsu Provincial Key Laboratory of Solid Waste Recycling Technology and Equipment, and also built the largest plasma laboratory in China. Jiangsu Tianying has won the National Manufacturing Individual Champion, Jiangsu Province Science and Technology Progress Award and dozens of provincial and ministerial honors.

3. Research Areas

Waste incineration fly ash harmless treatment

4. Opportunity Description

The fly ash plasma melting technology of MSW incineration is to use the high temperature plasma of 5000-20000℃ to heat the fly ash to melt efficiently, and completely destroy the persistent toxic organic matter such as dioxins and furans in the fly ash. By adding silicon oxide, the Si-O mesh structure is formed by melting treatment. The heavy metal is encapsulated and solidified in the mesh, forming extremely stable vitreous body and completely realizing harmless. Vitreous can be used as road or building aggregate; The molten flue gas can be separated from chlorine and sulfur by different solubility of acid gas, and the by-product salt can be prepared to realize resource utilization. (Meet GB5085.3 "Hazardous Waste identification standard leaching toxicity identification"), and fundamentally destroy the dioxins in fly ash, exhaust emissions meet DIRECTIVE 2010/75/EU and GB18484, industrial wastewater nearly zero discharge. The technology has the characteristics of reliability, durability, safety and so on. The technology completely solves the problems of chlorine, dioxins and heavy metals in the fly ash of municipal solid waste incineration, without secondary pollution and the risk of leakage of inflammable and explosive high toxic substances.

Tianying, after years of independent research and development, the establishment of fly ash disposal scale of 40 tons/day fly ash plasma resource demonstration project, a breakthrough in plasma fly ash resource equipment and technology, the realization of industrialization. This year, the technology has been listed in the Catalogue of National Advanced Pollution Prevention technologies, reaching the domestic first, the international leading level, with fully independent intellectual property rights.

5. Country Focus

China, South Aisa, etc.

6. Partners Contribution

The technology and key equipment are developed by Jiangsu Tianying Plasma Technology Co., Ltd. Independently.

7. LOOKING FOR...

Energy and Environmental protection enterprise, Solid waste disposal enterprises,

Environmental management enterprise.

Plasma Gasification Disposal Technology of Medical Waste

(Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd., China)

1. Abstract

This technology adopts plasma gasification process to treat medical waste, with good environmental protection effect, completely destroy its toxic and harmful characteristics and eliminate its infectivity, and realize harmless, capacity reduction and resource disposal.

2. Organization Introduction

Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd was founded in 2010, and is the main subsidiary of China Tianying Inc. (stock code: 000035). The main business of the company is researching, developing and manufacturing flue gas treatment equipment, waste incinerator, plasma equipment and so on. The company was identified as a Jiangsu Provincial Key Laboratory of Solid Waste Recycling Technology and Equipment, and also built the largest plasma laboratory in China. Jiangsu Tianying has won the National Manufacturing Individual Champion, Jiangsu Province Science and Technology Progress Award and dozens of provincial and ministerial honors.

3. Research Areas

Medical Waste Treatment

4. Opportunity Description

For high chlorine-containing organic wastes such as medical waste, advanced plasma technology is adopted to completely destroy dioxins and other persistent organic pollutants, which can meet the stringent emission standards of China and the EU, and realize the harmless of all categories of medical waste. High temperature molten vitreous can effectively solidify and stabilize heavy metals, forming recyclable building materials and road aggregates, and realizing capacity reduction and resource utilization.

Tianying after years of independent research and development, plasma torch and gasser and other core equipment technology research and development and equipment design and manufacturing fully independent, is currently in Jiangsu, Henan and other 5 projects to promote, the next five years to promote 100 projects, market space of 10 billion.

5. Country Focus

Europe, South Aisa.

6. Partners Contribution

The technology and key equipment are developed by Jiangsu Tianying Plasma Technology Co., Ltd. Independently.

7. LOOKING FOR...

Energy and Environmental protection enterprise, Solid waste disposal enterprises Environmental management enterprise.

Municipal Solid Waste Incineration Flue Gas Cleaning Technology and Equipment

(Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd., China)

1. Abstract

This technology process consists of "SNCR furnace denitrification + semi-dry deacidification + dry lime injection + activated carbon adsorption + bag house filter", $Ca(OH)_2$ is applied as flue gas purification absorbent to remove acid substances in flue gas; Activated carbon is used as adsorbent for flue gas cleaning to remove dioxins, heavy metals and other hazardous substances. The reductant containing NHx base is sprayed into the combustion chamber of 800-1000℃ in the incinerator to decompose NOx in the flue gas into N2. The dust in the flue gas is collected by bag filter, and the dust collect efficiency is not lower than 99.9%. The emission level is higher than the emission standards of EU 2000, which is conformed to the environmental requirements.

2. Organization Introduction

Jiangsu Tianying Environmental Protection Energy Equipment Co. Ltd was founded in 2010, and is the main subsidiary of China Tianying Inc. (stock code: 000035). The main business of the company is researching, developing and manufacturing flue gas treatment equipment, waste incinerator, plasma equipment and so on. The company was identified as a Jiangsu Provincial Key Laboratory of Solid Waste Recycling Technology and Equipment, and also built the largest plasma laboratory in China. Jiangsu Tianying has won the National Manufacturing Individual Champion, Jiangsu Province Science and Technology Progress Award and dozens of provincial and ministerial honors.

3. Research Areas

Municipal Solid Waste incineration is the waste treatment technology with significant advantages in effective recycling, efficient reduction and resource utilization. The key point is how to control the emission concentration of pollutants in the flue gas produced

by waste incineration. This technology starts from the components of waste incineration flue gas, through the process technology and equipment of "SNCR furnace denitrification + semi-dry deacidification + dry lime injection + activated carbon adsorption + bag house filter", to solve this major problem. Meanwhile, this technology has the characteristics of short process, low investment, low operation cost, high efficiency, meets the requirements of the European Union emission standards, and is considering appropriate measures to meet the requirements of future environmental standards.

4. Opportunity Description

This system has the advantageous of stability and safety characteristics, the rotating atomizing reactor is equipped with a unique air distribution diversion device, which can guide the flue gas vortex movement, atomize head atomized lime slurry fully mixed neutralization reaction, and ensure the removal rate of HCl ≥95%, SO_2 removal rate ≥90%. Dry lime and activated carbon transportation are using weighing and weightlessness technology, which can real-time control of instantaneous and cumulative flow of materials. The bag filter adopts 100% PTFE + PTFE membrane coated bag, and the dust removal efficiency is ≥99.9%. The negative pressure in the technical system reaches -3000Pa to ensure zero leakage of pollutants produced by incineration. The deacidified reactant, the fly ash, is sent to the fly ash solidification system to be chelated and solidified before being sent to the landfill. Through the transformation of the project product achievements, the project products have reached the domestic leading and international advanced level, and formed the famous brand products with independent intellectual property rights and national patent protection.

Our technology and products have been successfully applied in the Incineration Power Plant in Vietnam. In the next step, we hope to promote it in other Belt and Road countries to solve those countries solid waste problem and achieve pollutants harmless treatment.

5. Country Focus

Europe, South Aisa, etc.

6. Partners Contribution

Environmental protection Company, especially engaged in the incineration of domestic waste company.

7. LOOKING FOR...

We hope to find enterprises engaged in MSW incineration and know whether they are willing to use our technology to deal with the flue gas of MSW incineration.

Distributed Village and Town Sewage Treatment Technology

(Nanjing Wondux Environmental Protection Technology Corp., Ltd, China)

1. Abstract

Distributed village and town sewage treatment technology and equipment are mainly used for village and town decentralized sewage treatment and it is a series of equipment products specially developed for difficulties of rural sewage treatment and can be divided into ground type and buried type to satisfy different drainage water quality requirements of users. It solves the problems of high cost of centralized collection and treatment of decentralized sewage in villages and towns and pipeline construction; large fluctuations of water quality and quantity; difficult operation and maintenance.

2. Organization Introduction

As an intelligent environmental governance and resource utilization expert and high-tech enterprise, Wondux professionally provides advanced environmental protection technology and equipment, system integration and overall solutions to environmental problems. The main businesses involve comprehensive treatment of waste pollution, industrial wastewater treatment and recycling, and ecological restoration. We have been listed on Sci-Tech innovation board of "ecological protection and environmental governance industry" (stock code: 688178). And we have been developed as an outstanding private enterprise in the national torch characteristic industrial base and top 100 innovative enterprise in Jiangsu.

3. Research Areas

Resource and environment

4. Opportunity Description

In view of the characteristics of water quality of rural domestic sewage, Wondux has designed and developed decentralized sewage treatment equipment with a scale of 1-150m^3/day, which is divided into buried type and ground type. The company can provide overall solutions to environmental problems through general project contracting and equipment general contracting, including integrated services such as technology development, project consulting, equipment supply, and engineering construction.

The buried decentralized sewage treatment equipment adopts a five-chamber structure design, namely sewage inlet, oil separation and grit chamber, anoxic tank, facultative aerobic tank, aerobic tank, sedimentation tank, and effluent. The ground-type decentralized sewage treatment equipment includes anaerobic tank, facultative aerobic tank, aerobic tank, sedimentation tank and equipment room from left to right.

The technical equipment adopts low-temperature resistant denitrification bacteria to cope with lower ambient temperature, and the multi-specification series products can be applied to the different needs of single-household treatment and multi-household centralized treatment to meet the different drainage water quality requirements of users. All units are integrated in a container, occupying a small area, which can adapt to a variety of ground and underground processing environments with easy installation and using. Through the

application of the Internet of Things technology, the cloud platform is used to monitor the water quality and volume of the equipment in real time, and the operation and maintenance is simple and efficient.

5. Country Focus

Developing countries

6. Partners contribution

The partners shall be in charge of market developing.

7. LOOKING FOR...

Organizations such as enterprises or governments

Epidemic Prevention & Off-grid Black Water Treatment & Recycling Toilets

(Clear (Suzhou) Environmental Technology Co., Ltd., China)

1. Abstract

a. Epidemic prevention: 99.99% removal of water borne bacteria and parasites by its biological processing design which stops broadcasting of disease on spot;

b. Off-grid-able operation: Can run without tap water, power grid nor sewage pipelines.

c. Large scale cost down in water and energy consumption – e.g. Saves over 1.2 million tons of water in ten years for a community of 2000 people.

d. Quickly transported, installed, commissioned and even re-located - Modular (container) for truck transportation, installation and commissioning can be done within 2-4 days.

e. Small foot print of 2-26 square meters (varies according to capacity).

f. Applicable to wide range of altitude, humidity and temperature, serving capacity range from 300-6000 people/day.

g. Saves manpower - Can be monitored and managed by cell phone App with which one man supervises 10 sites on scattered spots.

2. Organization Introduction

Clear (Suzhou) Environmental Technology Co., Ltd. (Clear) has been specializing in sewage treatment for more than 15 years with mature operation home and abroad. Clear is determined to bring the most environmental and economical toilets to the world, and share their rich experience in modularized sewage treatment from source to end (toilet water,

restaurant water and shower water…)

Clear's main products include Wastewater treatment & recycle toilets, Rotating Biological Contactor, Bio-Dry Toilets, Restaurant/industry Oil Grease Trap, Hospital Sewage Treatment, Pumps etc.

- Over 11 authorized patents by 2021
- National Key Technology of the China Ministry of Environmental Protection
- High-Tech Product of Jiangsu Province, China
- Best Practice of China Administration of Tourism and the Bill & Melinda Gates Foundation 2018
- Meets ISO30500 since 2020
- Bio-tech supplier of Dubai Aviation Engineering Group since 2020
- DEMO program launched in South Africa since 2020
- Invited to compete for Suitable Technology for The Belt and Road Initiative China in 2021

3. Research Areas

Environmental protection technology, biotechnology, water sanitation, fecal sludge management, energy conservation / energy reuse, assembly construction.

4. Open for Proposals until

Dec. 2021

5. Opportunity description

The opportunity in toilet revolution in China is large and long term
Scale segment by 2030

130000 toilets in tourist attractions
1.1 million rural public toilets lack sewers
73 million rural households lacking sewers
18 million new families live in green houses in water deficient cities every year

We welcome cooperation in:

- Public infrastructure procurement
- DEMO projects of water sanitation, environment protection, fecal sludge management in China, APAC, South Africa, India and US.
- DEMO projects by Ministry of Agriculture and Rural Area, Ministry of Education, Ministry of Environment Protection, China.
- Bidding for new real estate & industrial park development.
- R&D cooperation.

6. Country Focus

Countries in Asia, CIS, Central and Eastern Europe; Water scarce states in the U.S, and South Africa

7. Partners contribution

Investment, Buyer, Sales leads, Business Development, qualified bidder, whole seller, co-funder, local sales rep, R&D talents, technology contributor.

8. LOOKING FOR...

Governments, public project owners / implementer, standard committees, funding groups, commercial partners, research institutes, bio-tech experts.

III. OTHER FIELDS

Planning and Design Technology for Sustainable Industrial Parks

(Southeast University, China)

1. Abstract

Industrial Parks are important platforms to promote industrialization and urbanization. Industrial selection, spatial benefits and scale, spatial layout of industry, access control of projects and intensive optimization of built parks are the most key elements for the sustainable development of industrial parks. This technology constructs the planning and design methods of sustainable industrial park with GIS as technology platform and spatial benefits as the main line, including spatial scale analysis and planning based on spatial benefits, industrial spatial planning based on spatial suitability, project control guidelines based on spatial access, and spatial optimization and integration based on spatial benefits.

2. Organization Introduction

Southeast University (SEU), located in Nanjing, is a prestigious institution of higher learning renowned both at home and abroad. Center for International Collaboration and Research on Development and Planning of Sustainable Industrial Parks is a university research institution in SEU and an international think tank directed by Prof.Wang Xingping. Main research area of the Center includes industrial park development and planning, regional and spatial planning, and urbanization and spatial planning along the Belt and Road area. The Center has kept good cooperation with many planning and design institutions, research institutes, think tanks, industrial parks and enterprises at home and abroad.

3. Research Areas

Urban and rural planning and design, industrial park planning and design.

4. Opportunity Description

This technology covers the whole process of industrial development, spatial layout and project management of industrial parks, and has been widely used in the field of industrial park planning and design at home and abroad. It has not only promoted the technological innovation in planning preparation, but also promoted the planning management, and has achieved fruitful results in talent training and the spillover of scientific and technological achievements. The comprehensive benefits of this technology are mainly reflected in the

following:

(1) This technology promotes the technological progress of relevant planning, design and management, and the transformation of industrial parks and urban development concepts and models, which has a positive significance for the intensive and sustainable utilization of land resources. The technology has been successfully applied to the planning, design and management of industrial parks and urban industrial spaces in Nanjing, Suzhou, Xuzhou, Yangzhou, Yancheng, and other cities. In terms of planning and design, this technology has been applied directly or used for reference in more than 40 projects. In terms of planning management, it has guided the formulation of land supply plan in Luhe District of Nanjing, space control and access control in Suzhou and Tangshan high tech zones, industrial project management in Lianyungang, and industrial land planning and management in Changshu and Qinzhou.

(2) This technology has been widely used in the field of urban and rural planning at home and abroad. By building "school-enterprise alliance" platform, joint research platform and industry-university-research cooperation platform, it not only improves the application systematism, but also promotes the dissemination and implementation of the concept and technology of intensive and sustainable industrial space. Many urban planning and design institutions with high reputations in China have adopted or learned from this technology through project cooperation or cases. In recent years, the Center has cooperated with China Development Bank, SINOMA International (Nanjing) Engineering Co.,LTD. and other enterprises through overseas industrial park planning projects, and has promoted the application of this technology overseas. The Director of the Center has guided the planning and design course of graduates for three years, taking Ethiopian Eastern Industrial Zone, Juba Special Economic Zone of South Sudan and Sihanoukville Special Economic Zone of Cambodia as cases to explore the application feasibility of this technology in the planning of industrial parks along the Belt and Road area. The Center has jointly established research centers with overseas well-known universities and technical cooperation centers with overseas industrial parks or their development and operation enterprises to promote international research cooperation and practical application, including the Center for Industrial Park Development and Planning in EiABC as the cooperation with Addis Ababa University in Ethiopia, China-Palestine & Middle East Industrial Parks Planning Technology Center as the cooperation with An Najah National University in Palestine. In addition, the Director has been invited to attend the Expert Group Meetings of United Nations Industrial Development Organization (UNIDO) and the United Nations Economic Commission for Africa (UNECA) in the domain of industrial parks, and has undertaken the Comparative Research on the Localized Performance Indicator Systems of the International Guidelines for Industrial Parks in China commissioned by UNIDO.

(3) The Center has published a number of academic monographs and papers focusing on this technology, which has effectively promoted the interdisciplinary integration and talent

training. Academic results include 7 monographs, 42 journal papers, 5 doctoral dissertations, and 24 master dissertations. The academic achievements have been highly praised by experts and scholars at home and abroad. The Center has accepted 10 foreign students from countries along the Belt and Road area.

5. Country Focus

Ethiopia, Kenya, South Africa, South Sudan, Nigeria, Tanzania, Namibia, Laos, Vietnam, Thailand, Cambodia, The United Arab Emirates, Palestine, Syria, etc.

6. Partners Contribution

Provide opportunities for industrial park and city planning and design cooperation, assist in organizing training workshop of industrial park and city planning and design technology, help promote the application of sustainable industrial park and city planning and design technology, and provide certification for sustainable industrial park and city planning and design technology.

7. LOOKING FOR...

Looking for opportunities of cooperation on sustainable industrial parks and city planning and design with international organizations, domestic and foreign government departments, enterprises, industrial parks investors and operators, planning institutions, etc.

Figure Code Verification Traceability System

(Jiangsu Figure Code Information Technology, Ltd., China)

1. Abstract

The project breaks convention and creatively provides an integrated system of three anti-counterfeiting means: customized trademark code, mathematical combined double code and bound anti-counterfeiting code. Each verification and traceability security code has a unique exclusive key, which cannot be modified and imitated by the outside world. In terms of data security, in addition to the exclusive key protection of a traceable security code, some algorithms can be used to realize security management of data.

2. Organization Introduction

Our company is a national high-tech enterprise, a provincial certification double software enterprise, a private science and technology enterprise, with its own independent

engineering research center, technology research center, focusing on the new generation of

graphic code information technology, new graphic code product software development and operation of interactive data platform system. At the same time, he is also a member of the provincial and national education equipment association. The company registered capital of 10 million yuan, the main products include: graphic information storage, information interpretation equipment, Internet of things accessories, stationery teaching AIDS RESEARCH and development, manufacturing, sales; New computer research and development; Graphic design; Software development, etc.

3. **Research Areas**

Information security and information management

4. Open for Proposals until

Dec. 30, 2021

5. Opportunity Description

The customized trademark code service in this project needs professional designers to complete. The mass production of customized trademarks first needs to solve the problem of production personnel, which gives rise to a new professional identity -- graphic code designer. Our company has established a graphic code maker platform to train graphic code designers and reserve talents for mass production and industrialization development of customized trademark codes. The training courses are based on basic knowledge, production operation and development platform, code standards, code testing, etc. Those who pass the training and have the intention to develop in our company will become a member of our company. The company plans to set up branches or agents in various cities in Jiangsu province within two years, and these excellent graphic code designers will become the management staff of the branches.

6. Partners Contribution

The project has been developed and tested, and can be put into use. Because the company's sales team is limited, we seek marketing partners to push the product into the market and find representative enterprises to achieve cooperation. At the same time, assist the company to formulate annual sales plan and actively complete the established project tasks.

7. LOOKING FOR...

Sole proprietorship or partnership

For more information, please contact:

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https://saira.eco/saira2/pub/