2011

South-South Cooperation on Science and Technology to Address Climate Change

Applicable Technology Manual

South-South Cooperation on Science and Technology to Address Climate Change **Applicable Technology Manual**

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2nd Edition

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South-South Cooperation on Science and Technology to Address Climate Change

Applicable Technology Manual

China Science and Technology Exchange Center

2nd Edition

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Editorial Board

The Editorial Board appreciates comments and suggestions from the readers.

FOREWORD

Global climate change has affected efforts made by developing countries to achieve economic growth, poverty eradication, livelihood improvement and sustainable development. Many developing countries face challenges closely related to climate change, such as energy and resources shortage, public health, disaster prevention and mitigation, and food security, etc. Addressing such formidable challenges calls for international actions, including South-South, South-North, and tri-party collaboration as well as participation of international organizations and other stakeholders.

Science and technology provides an important means to address climate change. Many developing countries share similar natural and environmental conditions, stages of development and challenges. To develop and disseminate climate-friendly technologies tailored to developing countries is instrumental in helping them better adapt to climate change, prevent and mitigate disasters, enhance energy efficiency, develop clean energy and achieve sustainable development.

The South-South science and technology collaboration to jointly address climate change could help developing countries better understand their own technology needs, strengthen the absorption of imported technologies and local R&D capabilities, and train indigenous scientists and technicians. It will facilitate the integration of responses to climate change with efforts to achieve sustainable growth and UN Millennium Development Goals. It will further boost green economy, eradicate poverty and improve livelihood in developing countries and benefit all mankind. South-South cooperation reflects the solidarity, resolution and unremitting efforts of developing countries in tackling challenges. It will add extra impetus to developed countries to abide by their obligations as identified in the *United Nations Framework Convention on Climate Change*, including providing funds and transferring technology to, and supporting capacity building in developing countries.

Like other developing countries, China also faces formidable challenges arising from climate change. As the most populous nation, the per capita GDP, income, energy consumption and reserve in China are rather low. Its socio-economic progress is prone to the adverse impact of climate change, such as fragile ecosystems, complicated meteorological conditions, and frequent natural disasters. To address these challenges, China has developed a complete set of applicable technologies in agriculture, forestry, energy conservation, new energy

FOREWORD

and renewables, public health, water resources, environmental protection, disaster prevention and mitigation, etc. The dissemination and deployment of these technologies has played an important role in promoting energy conservation and emissions reduction, adapting to climate change and raising people's living standards in China. Over the past few years, climate change has become a priority for S&T collaboration between China and its international partners. We stand ready to enhance cooperation with other developing countries on the basis of equality, mutual benefit and reciprocity to jointly cope with various challenges of global climate change.

At the United Nations Climate Change Conference (COP16/CMP6) in Cancún in 2010, the Ministry of Science and Technology of China (MOST) issued *The Applicable Technology Manual for South-South Cooperation on Science and Technology to Address Climate Change (First Edition)*, which was warmly welcomed by developing countries and international organizations. After the Cancún Conference, MOST has worked together with UNDP in China, UNEP, UNESCO, South Centre and the Third World Network (TWN), and compiled the second edition of the Manual. We have also launched the Network/Platform for International Science and Technology Cooperation: Address Climate and Achieve Sustainable Development (http://www.actc.org.cn). I hope the Manual and the Network/Platform will further promote joint efforts among developing countries, including policy study and planning, technology research, development, transfer and dissemination, technical training and capacity building so as to enhance the capabilities of developing countries in response to climate change and promote common development.

WAN Gang
Minister of Science and Technology,
The People's Republic of China

Beijing Statement

October 20, 2011 Beijing, China

We, delegates from developing countries and international organizations, gathered in Beijing from 19 to 20 October 2011 to attend the *Workshop on South-South Cooperation on Science and Technology to Address Climate Change* co-organized by the Ministry of Science and Technology (MOST), P. R. China, the United Nations Development Programme (UNDP) China Office, the United Nations Environment Programme (UNEP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the South Center, and the Third World Network (TWN). Delegates from the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat also attend the Workshop.

We met to discuss topics related to technology needs in developing countries, best practices and potential mechanism of South-South cooperation on science and technology to address climate change as well as the design and launching of a network/platform to promote South-South cooperation on knowledge diffusion, technology development and transfer, information sharing related to climate change. With a deeper understanding of the common challenges and comparative advantages of developing countries, we share strong confidence in what we may achieve and hereby agree as follows:

1. We reaffirm that the global nature of climate change calls for the widest possible cooperation on science and technology by all countries, in accordance with their common but differentiated responsibilities, respective capabilities and specific social, economic, eco-environmental and food security conditions, and bearing in mind that socio-economic development and poverty eradication are the first and overriding priorities of developing countries.

2. While developing countries are particularly vulnerable to the adverse effects of climate change, we find ourselves lacking the means and capacities to acquire and use scientific knowledge as well as more cost-effective and applicable technologies. Therefore we focus on the demand and supply of affordable, practicable, low-maintenance, effective and environment-friendly technologies for climate change adaptation and mitigation, and explore the potential of building indigenous technology capacities and human capital in developing countries.

3. We are committed to building a long-term network/platform, among other measures, in an open, transparent and inclusive manner, promoting cooperation on knowledge diffusion, technology development and transfer and information sharing related to climate change among developing countries. The network/platform will focus on science and technology cooperation to address climate change and achieve sustainable development.

4. We believe that South-South cooperation could play an important role in the efforts of building capacities in developing countries, including facilitating the training of local research and technical staffs, building indigenous technological capabilities, etc. We also emphasize the importance of the North-South and tri-party collaboration as well as participation of and assistance from developed countries, international organizations and other donors in the development, transfer and deployment of technologies that can help increase resilience and make due responses to the adverse impacts of climate change in developing countries.

5. It is widely agreed by delegates that South-South cooperation shall not exempt the obligation of developed countries to provide financial and technological supports to the developing countries in accordance with UNFCCC for combating climate change. We strongly call on developed countries and the international community to meet their obligations in supporting developing countries' efforts to address climate change and achieve sustainable development, and provide more assistance in particular to least developed countries (LDCs), African countries, Small Island Developing States (SIDS) and any other developing countries vulnerable to climate change.

We agree to submit to, and disseminate the Statement at the United Nations Climate Change Conference to be held in Durban in November/December 2011. We thank the efforts made by MOST, UNDP, UNEP, UNESCO, the South Centre, the Ministry of Foreign Affairs of Denmark and TWN for organizing the Workshop. We maintain that in the new era, developing countries have common development goals and converging interests which offer a broad prospect for cooperation. Based on traditional partnership, equality, mutual benefit and reciprocity, we will continue to work together and make new progress in addressing climate change, achieving United Nations Millennium Development Goals (MDGs) and common prosperity.

(END)

Introduction

This Manual aims at facilitating cooperation among developing countries in addressing climate change through joint research and development, technology transfer and dissemination, training, building indigenous technological capability and human capital. Economic and social development and poverty eradication are the first and overriding priorities of the developing countries. Therefore, the Manual is combining climate change related cooperation with the goal of achieving sustainable socio-economic development, eliminating poverty and protecting the environment in developing countries.

Based on the 1st edition of the Manual released at UNFCCC COP16/CMP6 in Cancun, 2010, the 2nd edition is revised consisting of one comprehensive volume and three sub-volumes in the field of renewable energy, agriculture and forestry, water resources and environmental protection respectively.

In order to contribute to further improving the capacity of developing countries in addressing climate change and promoting sustainable development, Ministry of Science and Technology, China has launched the Network/Platform for International Science and Technology Cooperation: Address Climate Change and Achieve Sustainable Development. With the goal of promoting knowledge diffusion, technology development and transfer, information sharing, the Network/Platform is an open, non-profit Platform to facilitate international science and technology cooperation for the benefit of all users from the world. The PDF version of the Manuals is available for download form the website (http://www.actc.org.cn) of the Network/Platform.

Partners from developing and developing countries, international organization and other stakeholders are warmly welcome to joint us in building up this Network/Platform.

More information, please visit http://www.actc.org.cn.

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Renewable energy technologies

Energy is highly important for the economic development of a nation and the improvement of its people´ s living standard. The major source of GHG comes from the buring of fossil fuels, and the use of renewable energy technologies such as solar power, hydro power, wind power and biomass can effectively reduce GHG and other pollutants, offering important substitutes for traditional fossil fuels and key solutions for energy mix optimization. Low-cost, mature and applicable renewable energy technologies are crucial to the energy revolution in developing countries.

1. Solar photothermal technology

Technology overview

Functions and use: Adopts active and passive solar heating and cooling technologies and in combination with building roof photovoltaic power generation systems, solar water heating systems, water source heat pump technology and energy-saving LED lighting technology, provides households with hot water, heating and electric power and effectively reduces energy consumption in buildings.

Technical information: Average annual solar energy assurance rate: 50%～70%. In combination with active and passive solar heating and cooling, grid-connected/disconnected roof photovoltaic power generation, solar water heating system, water source heat pump, energy-saving LED public lighting, attached solar air heat collector technologies and corresponding indicators.

Scope of application: Suitable for countries and regions with rich solar energy resources.

Technological features: Lowers energy consumption in buildings maximally uses solar energy and reduces conventional energy consumption.

Status of application

Has been promoted and applied; ready for use after simple training; high initial input cost but low subsequent use cost; and users can perform their own maintenance, low maintenance cost.

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Solar energy

2. Solar photothermal technology

Technology overview

Functions and use: Depending on user requirements, this product technology can provide 45-95℃ hot water to meet the water needs for domestic, partial industrial and solar air conditioning purposes.

Technical information: Household-use solar products vary from 75L to 230L in volumetric capacity.

Scope of application: Meets water needs for domestic, partial industrial and solar air conditioning purposes.

Technological features: The product comes in 2 forms: a vacuum tube heat collector and a flat panel heat collector. Based on user demand, optimal water use solutions can be provided.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; no training is needed; low use cost; and users can perform their own maintenance.

Technology Provider

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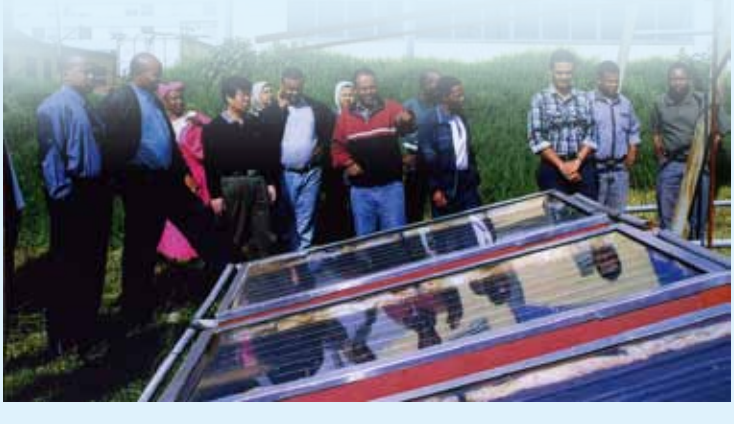

3. Solar cooker

Technology overvie

Functions and use: For heating water and cooking, and suitable for rural and livestock households or small insitutions.

Technical information: Power: 800W-1100W; light interception area: $\leqslant 2m^2$; cooking frame height: 1.2m-1.4m.

Scope of application: Suitable for rural and grazing regions, frontier regions and islands.

Technological features: Simple structure, easy access to materials and scale production; minimal amount of manufacturing equipment, small investment, mature technology and technical support is available.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; ready for use after simple training; low user cost; and users can perform their own maintenance, low maintenance cost.

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Solar energy

4. Solar PV power generation system products and technologies

Technology overvie

Functions and uses: Engineering design, consulting, supervision of solar photovoltaic systems; general contracting of stand-alone, grid-connected, stand-alone + grid connected, and BIPV systems; supporting engineering systems and undertaking of sub-divisional work of the system; industry chain related before-sale consulting services and after-sale maintenance/upgrade services.

Technical indicators: PV array: Including solar modules and devices; energy storage components: storage battery; control section: including the DC controller. Have the capability to produce 4500 tons of electronic grade polysilicon /year, 500MW of solar cells and 500MW solar module per year. Has formed an independent entire-industry chain service model that integrates material and product manufacturing, equipment R&D, technology R&D, engineering design and contract.

Features: mostly R & D and manufacturing of polysilicon and downstream products; solar cells and related products; solar cell modules and photovoltaic power generation system-related products. Have core technology and independent intellectual property rights; can carry out a complete industrial chain services including systematic application of solar modules, system integration, installation, BIPV, photovoltaic power plant construction.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; no training is needed; low use cost; high initial input cost but low subsequent use cost; maintenance free.

Technology Provider

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5. Solar photovoltaic power generation products

Technology overview

Functions and uses: PV power generation using solar energy.

Monocrystalline silicon module efficiency of not less than 15%, polycrystalline silicon module efficiency of not less than 14%, service life of modules of not less than 25 years.

Application scope: all types of building roofs, stand-alone PV systems.

Features: have research, development, manufacturing and installation and commissioning capabilities of solar systems developed over the years and experience in undertaking a number of solar energy demonstration projects.

Status of application

Has been promoted and applied; no training is needed; high initial input cost but low subsequent use cost; users can carry out their own maintenance.

Technology Provider

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6. Household-use photovoltaic power generation system

Technology overview

Functions and use: This system is especially designed for solar photovoltaic generation. It is mainly used to meet the daily power needs of households in remote regions with little or no electricity. The system consists of 5 main parts; an outdoor solar cell component, a standing column, an outdoor photovoltaic cable, a maintenance-free lead acid battery and an integrated control inverter. The outdoor solar cell component is fixed outdoors using a standing steel column. It converts sunlight into DC power, which is transmitted via the outdoor photovoltaic cable into the indoor integrated control inverter. The maintenance-free lead acid battery is placed inside an integrated control internet cabinet. A control circuit is used to store the electric power transmitted from the outdoor photovoltaic cables in a battery.

Technical information: Open circuit voltage: 42V; maximum working voltage: 35.5V; maximum working current: 4.79A; short circuit current: 5.36A; weight: 15.5kg; maximum overcurrent: 10A, maximum system voltage: 1000V DC; number of battery plates: 72 series. Test conditions: light intensity: 1000W/m^2; temperature: 25℃; and AM: 1.5.

Scope of application: Regions without electricity or with power shortages, pastoral regions, islands, frontier outposts and other regions which public grids cannot reach. This system is a low-power system for household use. Its total load power does not exceed 240W.

Technological features: The outdoor solar cell component of the system has received authoritative TUV certification and has a service life of over 25 years and a protection class of over Ip65. It can withstand the impact of D25mm hail at a speed of 23m/s. The integrated photovoltaic control inverter has a unique looking structural design and an integrated control/inversion design, which give the system such features as economy, practicality, ease of installation, reliability, and low consumption with high efficiency. The system converts low voltage DC power into 220 V/50Hz domestically useable AC power.

Status of application

Mature product; ready for use after simple training; high initial input cost but low subsequent use cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

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7. Solar photovoltaic power generation technology

Technology overview

Functions and use: (1) Solar off-grid generation system solves the problem of electricity usage for farmers and herdsmen in remote regions in developing countries, improves the standard of living and livelihood of residents. (2) Solar grid-connected generation system generates renewable energy in developing countries that meets the required sunlight conditions. And (3) Solar photovoltaic water pump is especially useful in arid and semi-arid regions and can meet the domestic, livestock and irrigation needs of farmers and herdsmen.

Technical information: (1) Solar cell efficiency: >17%; (2) solar inverter efficiency: >95%; and (3) household-use solar power generation equipment will continue to maintain the normal power supply for at least 3 consecutive cloudy days.

Scope of application: Solar photovoltaic generation technology has been widely used in agriculture, industry, energy and other fields.

Technological features: Europe, Oceania and a number of developing countries are the main markets for grid-connected generation systems. Among other countries and regions household-use systems and photovoltaic pumps have been widely used in Tibet, Guangxi and Inner Mongolia of China and in Nigeria, South Africa and Pakistan.

Status of application

The technology has already been put into use; can be put into industrial production in developing countries; is a mature product; ready to use after simple training; has high initial input cost, but later-stage cost of use is low and users can carry out their own maintenance.

Cooperation agreements have been signed with Pakistan, Egypt, Madagascar and other countries to provide them with solar photovoltaic generation technology, and assist local enterprises in building up solar photovoltaic businesses. Related products and services are already in use in Egypt, South Africa, Nigeria, Pakistan and other developing countries.

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Solar energy

8. High-efficiency, low-cost crystalline silicon solar cell

Technology overview

Functions and use: crystalline silicon solar cells for use in photovoltaic power generation, in the interest of energy conservation and environmental protection.

Technical information: Monocrystalline silicon solar cells have a conversion efficiency of over 17%, while polycrystalline silicon solar cells achieve over 15%.

Scope of application: Widely used in photovoltaic power generation systems (solar power plants, BIPV, household-use solar systems and other application products and facilities) of different forms and different sizes.

Technological features: Innovation, high efficiency and low cost -- large-scale use of self-made core equipment and independently developed processes and technologies. Among them, the cost of self-made core equipment is only 1/3-1/2 of that of similar equipment.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training; high up-front cost but low cost of use; and easy self maintenance.

Has been used as a domestic home appliance in remote regions in Uganda. Such application has not only met power demand of households in the region but also advocated the low carbon, green ideas and facilitated the use of the product.

Technology Provider

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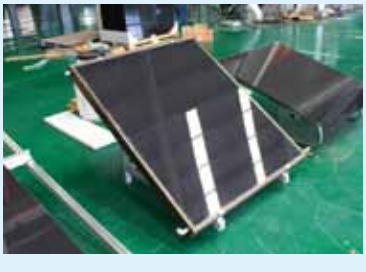
9. Solar photovoltaic and photothermal utilization and integrated solar building technology and equipment



Technology overvie

Functions and use: This equipment is used for solar photovoltaic power generation and water-heating. It can be used to provide domestic water and assistant heating in winter.

Technical information: For photovoltaic and photothermal utilization: photovoltaic conversion efficiency: 8.5%; photothermal conversion efficiency: 35%-45%. Equipment dimensions: 1400 × 1200 × 100mm (L × W × T). For solar buildings: power generation efficiency: 8.5%; light penetration rate: opaque-30% transparent, adjustable; dimensions: 2.6 × 1.1m, 1.3 × 2.2m, 1.1 × 1.3m, and 1.1 × 0.65m.

Scope of application: Can be installed on roofs or in sunny areas on the ground, and combines solar power generation with building materials. The generated power can be used with storage cells for off-grid or on-grid usage.

Technological features: Effectively combines buildings with photovoltaic power generation to meet the needs of buildings, produces the desired visual effect and connects to grids. It is an efficient product for energy conservation and emission reduction. In addition, it uses solar energy to generate power and heat and improves the overall utilization rate of solar energy. While generating heat, it also lowers solar cell panel temperature and improves the efficiency of power generation.

Status of application

Can be put into commercial production in developing countries; mature product; no training is needed; low use cost; high initial input cost but low subsequent use cost; and users can perform their own maintenance .

Technology Provider

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Solar energy

10. Polycrystalline silicon solar cell manufacturing technology

Technology overview

Functions and use: The technology is used for solar photovoltaic generation. Polycrystalline silicon is the main material used in the making of solar cells. Polycrystalline silicon solar cells are the mainstream product in the international photovoltaic market at present. Such products can partially replace mainstream fossil energy and provide clean electric energy.

Technical information: Polycrystalline silicon solar cells achieve an average photoelectric conversion efficiency of 16.5%, with a product range of 1W～350W, which can be flexibly adjusted according to market demand.

Scope of application: Suitable for residential use, oil transmission pipe cathode protection and independent power supply in remote regions. Among these, the widest and the fastest-developing application involves the use of integrated photovoltaic buildings (including roof solar cell panels, solar cell tiles and solar cell glasses for commercial buildings) on building roofs to establish household-use or public photovoltaic systems. In addition, large-scale outdoor solar photovoltaic off/on-grid power plants have entered a stage of large-scale promotion and application.

Technological features: Solar photovoltaic power generation is now a mature technology, offering such advantages as safety, reliability, noise-free operation, non- polluting, wide energy availability, no geographical restrictions, no fuel consumption, no mechanical transmission components, low equipment fault rate, simple maintenance, unattended operation, short construction cycle, choice of size, no need for power transmission line and blends in well with architectural surroundings. These advantages are unrivaled by conventional power generation technologies.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is needed; high initial input cost but low subsequent use cost; and users can perform their own maintenance .

Technology Provider

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11. High-efficiency, photovoltaic DC water lifting system

Technology overview

Functions and use: The whole system consists of 3 parts: a solar power generation system, a control system and a water making system. The solar cell array consists of several serial solar cell components. It absorbs solar radiation and converts it into electric power. With conversion, it can directly drive high-efficiency, photovoltaic DC water pumps to work. Maximum lift: 200m; and flow: 0.3m³--20m³ (high flows can be achieved by connecting several pumps in parallel).

Technical information: Maximum lift: 200m; flow: 0.3m³--20m³.

Scope of application: Desert control, seawater desalination, agricultural irrigation, domestic water, forest irrigation, urban waterscape, landscape fountain water, grazing grassland, island water supply and water treatment work.

Technological features: DC motors feature high thermal energy conversion efficiency and reduce the usage of solar photovoltaic panels by 30%. Piston pump efficiency can reach 85%. Other features include easy installation, flexible operation and minimal maintenance.

Status of application

Can be put into industrial production in developing countries; ready for use after simple training; high initial input cost but low subsequent use cost; and users can perform their own maintenance, low maintenance cost.

Technology Provider

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Solar energy

12. Solar Receiver—coated steel tube

Technology overview

Functions and use: It is a kind of solar selective absorbing coating product able to be applied in medium and high-temperature（300-350℃）air. The coating absorbs the sunlight and heats the heat transfer working fluid inside the pipe to 300℃, to directly or indirectly drive the turbine to produce electricity or steam.

Technical information: The absorption ratio of such tube can be greater than 95%, and the emission ratio lower than 8% when in 300℃. Moreover, the coating has shown excellent performance in long-term operation, almost has no attenuation.

Scope of application: Has been promote and applied in Fresnel thermal power generation or industrial steam system.

Technological features: Himin solar receiver has intellectual property rights. The selective coating film has shown stable performance during 1500h age testing when in 300-350℃ air.

Status of application

mature product; special training is required;before use; high initial input cost but low subsequent use cost, maintenance personnel need to be trained or a maintenance station needs to be established.

Himin solar receiver has been applied in Fresnel thermal power generation all over the world. The 1.4MW system operated in 2009, and 30MW is under construction, will operate in 2012 in Spain. The pilot systems in Italy, France, Australia and India shows good test result.

Himin built a 2.5MW Fresnel solar thermal power demonstration project in China Solar Valley, which was the first MW-level Fresnel solar thermal power station and worked well.

Technology Provider

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13. Cost-effective small hydropower electromechanical technology

Technology overview

Functions and use: Small hydropower is China´ s richest renewable energy at present, accounting for 98% of the total national renewable energy. Small hydropower is particularly suitable for rural regions in developing countries. Cost-effective small hydropower electromechanical technology is applicable to regions with small hydropower resources. It can improve returns from project investment, promote small hydropower development and meet power needs in rural regions and reach those not covered by large grids.

Scope of application: Various products have been exported to dozens of countries and regions and successfully applied there. The technology can be used in inland, mountainous, forest, tropical, subtropical and temperate regions rich in water resources.

Technological features: Simple structure, reliability and easy maintenance. Technology and product standardization has become an essential means for lowering construction cost, speeding up small hydropower building and promoting small hydropower technology transfer and equipment trade. Self-maintenance equipment is adopted to reduce cost and improve performance. Unattended or less-attended automatic equipment is used, offering simple and reliable performance.

Status of application

Has been promoted and applied; mature product; ready for use after simple training; low user cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

The technology is under the Light up Africa Program. It has been used to build 100 village-level micropower plants in 10 countries including Cameroon, Ethiopia, Kenyan and Liberia and one 1MW small hydropower demonstration plant each in Zambia and Sierra Leone.

Technology Provider

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Small hydropower

14. Small hydropower/micro hydropower technology and equipment

Technology overview

Functions and use: Small hydropower can increase energy supply, improve energy structure, protect the ecological environment and reduce greenhouse gas emissions. Small hydropower has the advantages of distributed power supply and can rapidly resume power supply. Micro hydropower is a type of renewable energy that is economical and offers large development output. It is suitable for installation and use in remote mountainous regions with insufficient power supply.

Technical information: small hydropower: 100KW – 50,000KW; and micro hydropower: <100KW.

Scope of application: rural areas, remote regions and populated regions with rich hydropower resources.

Technological features: China has built 45,000 small hydropower plants, with a total installed generating capacity of over 51 million KW and an annual power output of over 160 billion KW. Both the technology and equipment are mature. The Asia and Pacific Small Hydropower Training Center has trained more than 1,000 students from over 100 countries.

Status of application

Has been promoted and used; can be put into industrial production in developing countries; ready for use after simple training; low operating costs; and users can carry out their own maintenance. Through short- and long-term cooperation projects between the Chinese and Vietnamese science and technology ministries, the two countries have strengthened technological cooperation. More than 3,000 sets of small hydropower/micro hydropower equipment have been used in Viet Nam.

Technology Provider

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15. Small hydropower automatic control technology

Technology overview

Functions and use: The application of small hydropower automatic control systems can improve the operational reliability of hydropower plants as well as the quality of power output, reduce both the number of operating personnel required and their workload, raise the operational stability of the grid and optimize plant operations.

Technical information: System MTBP: ≥17,000h; usability: ≥99.9%; and maintainability (with spare parts on site): ≤0.5h

Scope of application: The SDJK High Voltage Unit Smart Microcomputer Automatic Control System is applicable to 6.3KV and <50,000KW high voltage units in small rural hydropower plants, while the DZWX Low Voltage Smart Control System is suitable for 400V and <630KW low voltage units used in small rural hydropower plants.

Technological features: Flexible system combinations, and high applicability. Based on power plants´ different needs and actual configuration of the equipment, a total computer control system may be designed or used with conventional equipment to achieve varying degrees of automatic control. The systems are applicable in both newly-built power plants and as part of the renovation of old power plants.

Status of application

Has been installed and used; can be put into industrial production in developing countries; mature product; ready for use after basic training; inexpensive to use; high initial input cost, but low subsequent use cost; and users can carry out their own maintenance.

The system has been successfully operating at TAISHIR Hydropower Plant (with an installed generating capacity of 3 × 3450KW+1 × 650KW) for 3 years.

Technology Provider

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16. Micro hydropower technology

Technology overview

Functions and use: Micro hydropower generation technology converts micro hydropower resources from small rivers and creeks into civilian power. Micro hydropower plants are unattended plants which generate power mainly from runoff, operate off-grid and require no transformer equipment. Their power output can be directly used as the power source for lighting, home appliances and small agricultural byproduct processing equipment. It can meet the needs of several dozens households.

Technical information: Output power: 0.1-100 KW; output voltage: single phase 110/230V, 3 phases 230/400V and 400/690V; and output frequency: 50/60 Hz.

Scope of application: Micro hydropower generating units are serial products whose design is based on the distribution of local micro hydropower resources and the power demands of rural households. Users simply select generating units according to the local micro hydropower resources and power use demand. There are rich micro hydropower resources in hilly regions in China, Southeast Asia, Africa and Latin America.

Technological features: Micro hydropower plants involve very little installation work. Their operation, maintenance and repair have been kept simple to facilitate users. Only small ditches are needed to channel water to micro hydropower plants and this has no adverse affect on the local ecological environment.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; low use cost; and users can perform their own maintenance .

Technology Provider

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17. Biogas production of organic waste utilization

Technology overview

Functions and use: This technology can reduce waste generation, perform harmless treatment and turn waste into energy. While disposing of waste, it also generates clean renewable energy.

Technical information: Widely applicable raw materials, highly mechanized and automated, specific gas output capacity: > 1 m^3/m^3•d; and biogas´ methane concentration: >55%.

Scope of application: Industrial organic wastewater (waste) treatment, livestock breeding waste treatment, domestic waste and sewage, sludge treatment and agricultural waste treatment.

Technological features: Wide range of raw materials, mature technology, no secondary pollution, low operating cost and recoverable clean energy.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is required before use; inexpensive to use; and maintenance personnel need to be trained or a maintenance station needs to be established.

It has been used in Guyana. In a pilot scheme in two Egyptian provinces, a total of 5 Chinese-style household-use biogas systems have been built for middle-income households.

Technology Provider

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18. Soft household-use biogas-generating pit

Technology overview

Functions and use: This product is a new type of biogas production equipment developed to meet the biogas development needs of rural areas. It has 3 volume specifications: 6m^3, 8m^3 and 10m^3 (which are specified in accordance with the National Rural Household-Use Digester Standard). When fermentation process conditions are met, the biogas generated by one biogas digester can meet the basic cooking needs of one rural household. It is suitable for application and use in rural areas.

Technical information: The product has been awarded a national patent in China and also passed (CQC) ISO9001:2000 certification. It has 3 volume specifications: 6m^3, 8m^3 and 10m^3 (which are specified in accordance with the National Rural Household-Use Biogas Digester Standard). The soft cover has a service life of 8-10 years.

Scope of application: Household-use biogas digester in rural areas.

Technological features: (1) The product employs a combined structure of a fixed brick pit (the pit wall part) plus a hanging active soft cover. (2) High durability, with a long service life in normal use of 6-8 years. If additional cover material is added to the digester surface, the service life of the soft cover can be extended to 8-10 years. (3) A barostat may be installed at the end of the biogas transmission pipe to improve the biogas stove´ s operation and efficiency. (4) The hanging soft cover is easy to lift and install. It facilitates safe material

feeding and discharge and can prevent accidents. (5) Simple to maintain. If the hanging soft cover wears out while in use, it can be quickly repaired without affecting the performance of the biogas digester. (6) Simple structure, easy construction, short construction time (usually 2-3 days), and good gas sealing. Compared with traditional digesters, this new digester can cut construction cost by over 20%. And (7) this new biogas digester is suitable for factory and large-scale production.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use without training, inexpensive to use, and users can carry out their own maintenance.

500 sets of these digesters have been transferred to Canada, South Africa and other countries.

Technology provider

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19. Rural household-use biogas technology

Technology overview

Functions and use: This technology improves upon traditional household-use biogas pool in China. It can convert human and livestock excrement and crop straws into household-use biogas and thus consitutes an ideal biomass energy for energy conservation and emission reduction.

Technical information: An improved version based on China´ s national biogas production standard. Each biogas pool has a capacity of 8-10m^3. The biogas pool can be built into a ″Three-in-One″ or ″Four-in-Four″ compound biogas production base along with the water closet, the kitchen and the green house.

Scope of application: Tropical, subtropical and temperate rural regions with conditions for livestock breeding in Africa and Asia.

Technological features: Good heat preservation and high gas output. Biogas liquids and biogas residues can be recycled and reused to replace pesticides and fertilizes and increase crop yield; can protect the ecological environment; biogas liquids can improve seed budding rate; reduce the intensity of women´ s work; and promote the fattening of livestock.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; high initial input cost but low subsequent use cost; and users can perform their own maintenance .

Technology Provider

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Biogas and other biomass energies

20. Household-use biogas generator

Technology overview

Functions and use: Uses modified plastics as the main material and the injection molding technique to achieve the large-scale, standardized production of gas generators. The technology fills a niche in the rural household-use biogas device market where there is currently no mature industrialized product.

Technical information: Volume: 6m^3; gas leakage: <1%/24h when pressure is ≤8kPa; daily average gas output (effective volume): 0.3～0.5m^3; and strength safety coefficient (k): ≥2.65.

Scope of application: Rural households of 3-6 persons.

Technical features: Polypropylene, the modified plastic used in the generator, is an environment-friendly, recyclable and reusable material, with good mechanical, anti-seismic, pressure-resistant, air-tight, water-resistant, heat-preserving, corrosion-resistant, anti-aging, non-toxic and non-polluting properties. Product features include industrial production, stable quality, simple construction, easy installation, split production, on-site assembly, easy transportation, self-releasing pressure, self-draining liquid and slag, simple management and high pool construction rate and a service life of over 20 years.

Status of application

Has been promoted and applied; can be put into industrialized production in developing countries; ready for use after simple training; low use cost; and free from maintenance.

Technology provider

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21. Biogas project

Technology overview

Functions and use: Through biological fermentation, domestic and livestock waste is turned into biogas. Biogas can be used for heating and power generation. It effectively disposes waste and provides new energy.

Technical information: corrosion-proof reactor, concealment and safety of the gas storage system, reliable purification system, and gas output rate.

Scope of application: Large-scale biogas projects for household use, large-scale breeding farms and plantations.

Technological features: Use of advanced materials for the reactor and gas storage films. Rich experience in design, installation and construction; and qualified for large-scale biogas project construction.

Status of application

Has been promoted and used; mature product; special training is required before use; high initial input cost but low subsequent use cost; maintenance personnel must be trained or a maintenance station should be set up.

Has cooperated with Kenyan in household-use biogas equipment and technology projects.

Technology Provider

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Biogas and other biomass energies

22. Flat spherical modified plastics biogas pool

Technology overview

Functions and use: This technology solves a wide range of problems in the construction of currently widely-adopted concrete biogas pools, including heavy materials, difficult transportation, varying construction quality and hard to carry out factory-based, mechanical and standardized production.

Technical information: Biogas pools made of modified plastics can fully bear the operating load at maximum working air pressure. The modified plastic is buried underground and has a long service life, which experts believe can last for over 20 years. Sealing performance meets China's national standard requirements; and gas output rate reaches 0.3-0.5 m^3/m^3•d.

Scope of application: Suitable for new energy use in rural households

Technological features: Mechanical batch production; light weight and convenient transportation; convenient and fast installation; good sealing performance and free from most existing problems facing concrete biogas pits; long service life; and feeding/exit material pipes, fermentation chamber and water pressure chamber are designed to facilitate Three-in-One construction and integrated utilization.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training; low user cost; high initial input cost but low subsequent use cost; and users can perform their own maintenance .

Technology Provider

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23. Combined heat, power and manure generation technology

Technology overview

Functions and use: The technology uses livestock and fowl (cattle, pig, chicken and etc) excrement, crop straws, organic waste and organic waste water as raw materials to generate biogas from anaerobic fermentation. The generated power is brought into grids (or for self-use); residue heat from the power generator can not only keep the system itself warm but also be used for heating purposes in winter; generated biogas residues and biogas liquids can be used as superior quality organic manure, eventually achieving a large-scale biogas engineering technology model of zero pollutant emission, zero methane leakage and resource recycling and reuse.

Technical information: Fermentation concentration TS: 8%～12%; fermentation at medium temperature (38℃); volumetric gas output: ≥1.5 $m^3/(m^3 \cdot d)$; and power generator use efficiency: 80%.

Scope of application: Applicable to biogas projects of various sizes in different regions and climate environments.

Technological features: Achieves zero pollutant emission, zero methane leakage and resource recycling and reuse

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after special training; low use cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

This mature technology has been widely used in China and produced dual energy and environmental benefits. The technology provider is now designing a biogas project for a chicken farm in Bangladesh and a waste water treatment and biogas project in Pakistan, and will provide key set equipment and technical services to both.

Technology Provider

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Biogas and other biomass energies

24. Biogas power generation engineering technology

Technology overview

Functions and use: Compound anaerobic digestion technology is used to generate electrical power from the treatment of biogas from cattle farms, chicken farms, waste, straw, sisal and domestic sewage.

Technical information: (1) Breeding waste-generated biogas. Near average-temperature gas output capacity: 0.35 m^3/kgTs; (2) plantation waste-generated biogas. Near average-temperature gas output capacity: 0.85 m^3.

Scope of application: agricultural breeding waste, plantation waste, garbage and domestic sewage.

Technological features: High feeding concentration, high gas output rate, small device size, less investment, and wide scope for application.

Status of application

Has been promoted and used; mature product; special training is required before use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

Sisal biogas power generation project in Tanzania: Daily sisal sewage treatment capacity: 50 tons; biogas output: 1,200m^3; digestion device capacity: 1,700m^3; generating capacity: 150kw; daily power output: 1,800kwh. Hawala domestic waste biogas project in Cuba: Daily domestic waste treatment capacity: 30 tons; biogas output: 1,000m^3; generating capacity: 60kw; daily power output: 500kwh, and the rest is supplied as gas.

Technology Provider

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25. Complete biomass power generation technology and equipment

Technology overview

Functions and uses: make use of the biomass fuels power generation technology and equipment, including biomass fuels power generation boilers, biomass conveying technology and equipment, biomass collection and processing technology and equipment, sand energy forest and ecological recycling projects for biomass power generation.

Technical indicators: 12MW, 25MW, 30MW and other direct-fired biomass power generation technology, enabling power generation or cogeneration

Application scope: Industrial energy applications of agricultural/forestry residues; ecological restoration and recycling economic development of water containing sand.

Rated combustion efficiency higher than 90%, overall biomass power generation efficiency of 30%.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is needed; high initial input cost but low subsequent use cost; maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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Wind power

26. Small size wind generator

Technology overview

Functions and use: Only using wind energy, small size wind generator can be utilized to provide off-grid electric power supply to the remote area such as rural area, pastoral area, mountainous area and sea coast. The user could be individual householder farmer or a village.

Technical information: Rotor Diameter: 2~7.5m; Number of Blade: 3; Working Wind Speed: 3~25 m/s; Cut in Speed: 3 m/s; Rated Wind Speed: 8~12 m/s; Survival Wind Speed: 50 m/s; Rated Output Power: 0.3~5KW; Max Output Power: 0.44~5.8KW; Rated Output Voltage: 230~460V; Speed Regulation: Yaw regulating, Electromagnetic brake and passive stall controlling.

Scope of application: The small size wind generator can be utilized in plain area, pastoral area, mountainous area, sea coast, intertidal zone, island and ship, where is not typhoon and annual average wind speed is within 3~50m/s.

Technological features: Apply clean & environmental-friendly energy resource;Stand alone system can provide electric power to the off-grid area;Simple & compact structure;Easy to operation and maintenance.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; special training is required before use; high initial input cost but low subsequent use cost; maintenance personnel must be trained or a maintenance station should be set up.

Technology Provider

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27. Carbon fiber composite material wind turbine impeller blade

Technology overview

Functions and uses: to be used for more than 3MW (excluding 3MW) wind turbines to form the complete wind power generating set that converts wind energy into electricity.

Technical indicators: wind energy utilization coefficient greater than 0.47

Application scope: to be used for more than 3MW wind turbines.

Features: As the carbon fiber is expensive than glass fiber, the designer, out of consideration of the use cost, design the large blades using glass fiber / carbon fiber hybrid composite structure and the main load-bearing parts using the carbon fiber composite material, therefore giving full play to the effects of the high-strength lightweight carbon fiber . After the carbon fiber used as a reinforcing material in large wind turbine blades, the performance parameters of the blades see remarkable improvements, which are mainly manifested as follows: As the stiffness increases, the weight decreases; 2 . The power output of the wind turbine is more smooth and stable; 3. The manufacturing, transportation and installation costs of the wind turbines are reduced

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; simple training is needed. high initial input cost but low subsequent use cost; maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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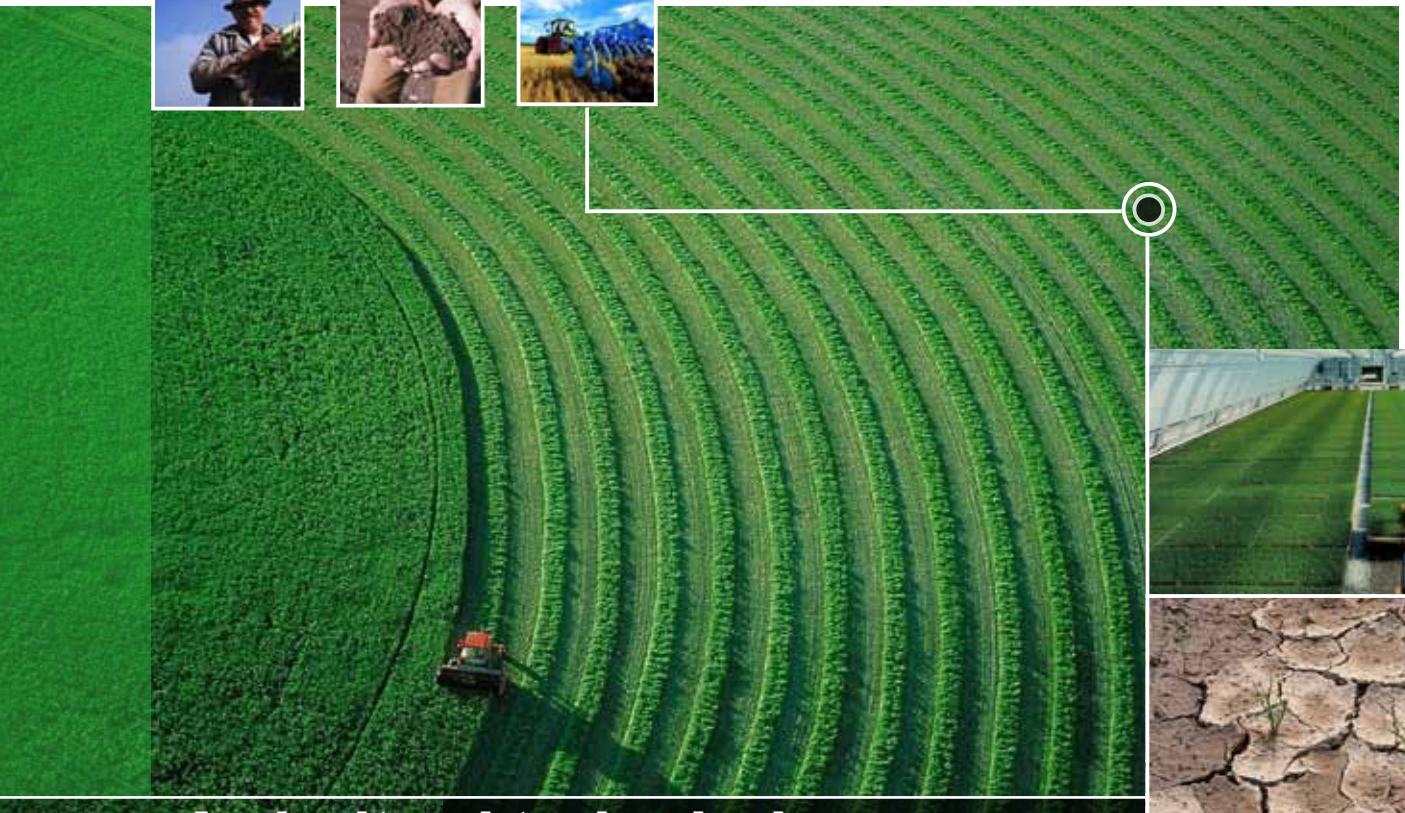
South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual



Agricultural technologies

Agriculture is fundamental to human survival. It is also the most vulnerable sector to climate change. Today, the world is still facing severe food challenges, with nearly 1 billion people living in hunger. The application of water-saving technologies for drought resistance, cultivating technologies for yield increase, plus the use of resistance varieties and environment-friendly fertilizers will not only increase developing countries' adaptation capacity to climate change in the agricultural sector, but also holds the key for poverty alleviation in these countries and the achievement of UN Millennium Goals.

28. Drip irrigation technology

Technology overview

Functions and use: Drip irrigation is a partial irrigation technology which slowly drips filtered water at a certain pressure into the plant roots via a drip irrigation system and water dropper.

Technical information: (1) 16mm built-in drip irrigation pipe with cylindrical dripper: flow rate: 3.0L/H; dripper interval: 30-100cm; and wall thickness: 0.8-1.2mm. (2) 16mm built-in drip irrigation belt with flat dripper: flow rate: 2.0L/H; 3.0L/H; dripper interval: 20-100cm, and wall thickness: 0.2-0.6mm. And, (3) 16mm single wing labyrinth dripper belt: flow rate: 2.8L/H; dripper interval: 30cm; and wall thickness: 0.2mm.

Scope of application: (1) Irrigation of field crops such as cotton, potato, pepper, tomato, maize, vegetables, etc. (2) irrigation of facility agriculture, such as greenhouse vegetables, flowers, seedlings, etc. (3) irrigation of cash trees and fruit trees, such as jujube, apricot, apple and peach trees, sugar cane, shelter belts and urban greening zones.

Technological features: (1) Water saving: usually saves 30-50% more water than ground irrigation; (2) even irrigation: drip irrigation evenness can usually reach 80-90%; and (3) yield enhancing: drip irrigation can duly supply water and fertilizer to the crop root zones, causes no soil compaction and can increase yield by over 30%.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use, high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

Each year, the technology provider directly transfers agricultural 16mm built-in drip irrigation belts with flat drippers to Thailand for vegetable and flower irrigation; transfers set technology and equipment to Mongolia for grassland irrigation; and transfers set technology and equipment to Cuba for sugar cane irrigation.

Technology Provider

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Irrigation and water-saving farming

29. Highly-efficient, water-saving field drip irrigation technology

Technology overview

Functions and use: This technology can meet the moisture and nutrient demands of crops at the correct time and in the right amount and provide a favorable growing environment in terms of the water, fertilizer, air and heat needed for field crops. It can speed up the crop development process, significantly enhance yield, improve agricultural product quality and greatly increase the efficiency of water and fertilizer use.

Technical information: Saves water by 30-50% increases the efficiency of fertilizer use by 10-15%, increases yield by 15-20% and raises quality grade by 1 class.

Scope of application: Field crops, melons, fruit and vegetables in arid regions.

Technological features: It is a controllable, precision irrigation technology that achieves high-efficiency water and fertilizer coupling. It can meet the moisture and nutrient needs of crops at the correct time and in the right amount with the added advantages of being simple to operate and convenient to manage.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is required before use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

This technology has been promoted and applied in Uzbekistan, Tajikistan, Pakistan, Zimbabwe, Benin, Togo and other countries over an area of over 10,000 Mu (one Chinese Mu is about 1/15 of a hectare), saving water by 40-50% and enhancing yield by around 50%.

Technology Provider

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30. Drought adaptation technology

Technology overview

Functions and use: properly integrates different drought-resistant technologies, including soil moisture monitoring and forecasting, balanced fertilization, straw mulching, membrane mulching, furrow planting, conservation tillage, rainwater harvesting and storage, drought-resistant chemical seed coating and integral regulation and control of water and fertilize, and selects drought-resistant species to form a water-saving technology system according to the local conditions of the dry farming.

Scope of application: Adapted to promote in the arid and semi-arid area.

Technological features: The integration of various technologies, simple to use, low cost, high output, water-saving and drought-resistant.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training; and low cost.

Technology Provider

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Irrigation and water-saving farming

31. Field under-film drip irrigation technology

Technology overview

Functions and use: Field under-film drip irrigation technology places the drip emitter under a plastic film to irrigate. By providing a timely and proper amount of irrigation for crops, it increases crop yield and quality and generates more income.

Technical information: save water by 40%~50%, raise fertilizer use efficiency by more than 30%, control soil salinity, improve land use efficiency by 5~7%, cut power costs by 20~40%, raise crop yield by around 30% and increase income by over $500 per hectare.

Scope of application: This technology is mainly for use with field crops, vegetables and fruits, fruit trees, ecological forest, greenhouses, desert afforestation, barren hill afforestation and so on.

Technical features: Simple, low cost, high output, water-saving and drought-resistant.

Status of application

Has been promoted and applied; can be put into industrialized production in developing countries; simple training is required; low use cost; and free from maintenance.

The technology provider has implemented water-saving drip irrigation projects in the following countries: Tajikistan (>800ha), Kazakhstan (1,000ha), Uzbekistan (100ha), Pakistan (100ha), Zimbabwe (30ha), Angola (33 ha), Togo (400ha) and Benin (200ha).

Technology Provider

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32. Field film mulching crop cultivation and yield-enhancing echnology

Technology overview

Functions and use: A crop plantation technology for dryland regions. The principle of this technology is to create alternating furrows and ridges, cover the ridges with film and plant crops in the furrows. Smooth film surfaces are used to redistribute and gather natural rainfall, and concentrate water around the seeds sowed in the furrows. This can effectively use small rainfall resources, notably improve moisture supply in dry farmlands and help crop growth. It can be used for corn, potato and other crops.

Technical information: (1) Select crop and prepare land. Dry flat land or terrace, mainly beans, wheat and potato crops; (2) Apply manure. Mainly use household manure at an amount of 3,000Kg per Mu (one Chinese mu is 1/16 of a hectare), with a combination of N, P and K fertilizers. (3) Select good seed. Early maturing or medium early maturing varieties; (4) Erect ridges. Use row markers to mark rows, with a width of 40cm for small rows and 70cm for big rows and a row height of 10cm. (5) Spread films. (6) Sow seed at appropriate times. Make point sowing in plantation holes, 3-5cm deep. 2 seeds in each hole and use fine sand or grass ash to seal holes. Cultivation density: 3,000-4,000 plants/mu (plant spacing x row spacing = 32-40cm x 55cm).

Scope of application: Suitable for promotion and application in semi-arid and arid regions with an annual rainfall of 300-350mm.

Technological features: Simple, feasible, low cost, high yield, water saving and drought-resistant.

Status of application

Has been promoted and applied; can be commercialzed in developing countries; simple training is required; low user cost; and maintenance-free.

Technology Provider

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Irrigation and water-saving farming

33. Water-permeable film mulching-based dryland high-yield cultivation technology

Technology overview

Functions and use: Adopts 1400mm-wide water-permeable film and three-row precision planters, applies sufficient base manure at one time, performs furrow opening, sowing and film covering at one time and allows due sowing. A wavy plantation zone is formed after seedlings are placed. It can gather micro rainfall to the crop roots, create a relative micro ecological environment with relatively favorable moisture, nutrient, air and heat and solve the problem of drought and moisture deficiency in crops.

Technical information: Water-permeable film width: 1400mm; depth: 0.006mm, and offering such features as water penetration, moisture retention, micro aeration, anti-aging and low pollution. Dryland corn yield is usually not below 1125kg/ha, with a maximum of over 15000kg/ha, 30% higher than dryland covered with ordinary film mulching and 100% higher than dryland without film mulching.

Scope of application: In cold regions with a total annual rainfall of >350mm, it can meet the water demand of high-yield corns. This new technology solves the difficult problem of moisture deficiency and can make full use of small rainfall resources and turn them into effective water for crop use.

Technological features: In ″VVV-shaped″ mulching, the 1400mm water-permeable film can push away dry soil at the surface and allow seeds to be sowed in wet soil, thus forming a micro porous green house. This helps fast seedling budding and causes no seedling burning. After seedlings are formed, the water-collecting furrows can gather small rainwater resources for high-efficiency utilization, equivalent to 2 times that of irrigation. This changes dryland into irrigated land.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is required; low user cost; and users can perform their own maintenance .

Technology Provider

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34. Hybrid rice technology and hybrid corn technology

Technology overview

Functions and use: Use different hybridization advantages of rice varieties to increase unit yield and improve rice quality. To a certain extent, hybrid varieties can resist low temperature, pests and other disasters and require low pesticide usage. Use different inbred advantages of corn varieties to increase corn yield, resilience and quality.

Technical information: Hybrid rice can increase unit area yield by 20-50% over conventional rice. Super hybrid rice can achieve a unit yield of 12 tons/ha. Hybrid rice can endure air temperatures below 5-10℃ or above 40℃ and offers a high disease (pest)-resistant capacity. Good hybrid corn seeds can increase yield by 10-30% over ordinary varieties.

Scope of application: Though different types of hybrid rice and corn varieties have their own particular regions, hybrid rice and corn technologies apply to all rice-growing regions.

Technological features: The advantages of hybrids are a general law of nature. After successfully achieving rice three-line and two-line support, hybrid rice technology has been widely accepted and used and been tremendously successful. Rice and corn hybridization advantages are mainly reflected in nutritional, reproductive, resistance and quality advantages.

Status of application

Mature product; ready for use after special training; high initial input cost but low subsequent use cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

The technology has been widely used in a number of countries in Southeast Asia and Africa.

Technology Provider

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Crop breeding

35. Wide-applicability rice variety

Technology overview

Functions and use: II You 838 is a new hybrid middle-season rice variety bred using hybrid breeding technology and radiomutagenesis. It can increase yield by 50% over Shanyou 63, the most widely planted variety at present.

Technical information: Planted as a middle-season rice, it has a total growth period of around 150 days, 1-3 days longer than Shanyou 63. With a plant height of 110-115cm, it has a strong resistance to lodging and a high seed setting rate. Its rice grains are translucent, with a small white belly. With a brown rice rate of 80.5%, it offers a better rice quality than Shanyou 63. Its rice plague resistance and field resistance are also better than those of Shanyou 63. It usually has a yield of 600-650Kg/mu(one Chinese mu is around 1/15 of a hectare), with the maximum at 800Kg/mu.

Scope of application: II You 838 is now one of the most adaptable rice varieties in the world. It is suitable for plantation in most regions in both hemispheres. Incomplete statistics show that from 1995 to 2000, II You 838 was planted over an accumulated area of over 150 million mu (one Chinese mu is around 1/15 of a hectare) in China, to become the most planted rice variety after Shanyou 63 in China. For several consecutive years, it is one of the most widely planted rice of the main varieties in China.

Technological features: High climatic adaptability, drought- and cold-resistant, superior rice quality and high yield.

Status of application

Can be put into industrial production in developing countries; special training is required.

II You 838 is a pilot variety which the Chinese government promotes worldwide. It has been planted in over 50 million mu in Bangladesh, Pakistan, Nepal, Myanmar, Malaysia, Guinea, Brazil, Peru and other countries. Among them, Viet Nam, by introducing the variety, has changed from a grain importer into a grain exporter.

Technology Provider

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36. Super hybrid rice variety

Technology overview

Functions and uses: fine rice variety.

Technical indicators: High yield, good quality, and strong adaptability. Under general fertility and cultivation conditions, the effective panicles per hectare may reach 1.65 million, 300 spikelets per panicle, and the 1000-grain weight is about 26g. The chalky grain rate of the rice is low; the rice is soft and delivers good palatability.

Application scope: suitable for developing and developed countries.

Features: large panicle, fewer tillers, lodging resistance; suitable for planting methods such as direct seeding or mechanized manipulating.

Status of application

The product is mature. No training is needed. The use cost is low. Maintenance by the customers is permitted.

Technology Provider

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Crop breeding

37. Hybrid rice plantation technology

Technology overview

Functions and use: Hybrid rice variety offers high yield, good adaptability and resistance to pests and can increase yield to over 20% more than that of conventional rice. Hybrid rice variety supporting plantation technology can improve both yield and efficiency.

Technical information: (1) Hybrid rice variety maintains a yield level of 40-47Kg/ha; (2) high-yield hybrid rice plantation supporting technology can increase yield by over 10%; (3) hybrid rice seed production technology produces a high breeding yield of 200Kg and can produce over 250Kg of seeds.

Scope of application: Asia, Africa, South America and Pacific island countries.

Technological features: This technology features wide applicability, good yield and efficiency enhancing effect and higher overall quality of rice. Its advantages over general conventional varieties include large yield potentials, less seed usage and better seed production technology.

Status of application

Has been promoted and applied; ready for use after simple training; inexpensive to use and maintenance personnel need to be trained or a maintenance station needs to be established.

The hybrid rice technology was put into pilot use in the Philippines, Morocco and Mali in 2009. It involved experimentation with and demonstration of hybrid rice varieties and small-scale plantation and breeding technology.

Technology Provider

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38. Xindong 20 fine wheat variety and cultivation technology

Technology overview

Functions and uses: to promote the high-year technology of fine wheat variety and carry out large-scale development.

Technical indicators: the average yield per mu is 477.6kg.

Application scope: desert oasis irrigation zones.

Features: combine the high-yield, high-efficiency wheat technology system, management technology system and economic benefit assessment of the wheat production technology to form the critical technology for high-year and high-efficiency wheat production in the desert oasis irrigation zone.

Status of application

The technology has been put into use. Simple training is needed. The initial investment is large. The subsequent use cost is low. Maintenance by the customers is permitted.

Technology Provider

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Crop breeding

39. High-temperature resistant, high-yield hybrid new rice variety II You 52

Technology overview

Technical indicators: (1) Yield: Average yield of 596.18 kg per 667m2,an increase of 4.60% compare to the check of II You 838; The yield per 667m2 in production test was 581.99 kg, an increase of 6.89% compare to II You 838. (2) heat resistance: the ability of the heat resistance was class 1, 2 levels higher than that of II You 838. In the demonstration projects in different regions, the variety shows a high seed setting rate and strong resistance to higher temperatures.

Application scope: applicable to the rice planting areas, especially the areas where the daily average temperature is higher.

Features: the product has such characteristics as high yield, resistance to higher temperature and low cost.

Status of application

The product has been put into use, may be industrialized in the developing countries and is mature. No training is needed. The use cost is low. The product is maintenance free.

Technology Provider

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40. Anti-scab or -sheath blight wheat varieties

Technology overview

Functions and use: Anti-scab or -sheath blight wheat varieties can be used in wheat production or as resistance sources to genetically improve wheat varieties.

Technical information: Reaches medium resistance to scab or sheath blight and generates yield equivalent to that of the control varieties.

Scope of application: These varieties can be put into pilot plantation in winter or spring wheat regions with warm winters.

Technological features: Disease-resistant varieties can reduce pesticide use, save agricultural cost, reduce pollution and increase yield.

Status of application

Mature product; simple training is required; low user cost; and users can perform their own maintenance.

Technology Provider

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Crop breeding

41. New sweet and glutinous maize variety

Technology overview

Functions and use: The new sweet and glutinous maize variety can be used to produce or process fresh and edible fruit and vegetable products, such as fast-frozen maize, tinned maize and maize drinks. These can also be used as the raw material for other deep processing products.

Technical information: Possesses overall fine qualities, such as high yield, superior quality and resistance to disease. But, different varieties adapt differently to temperature.

Scope of application: Suitable for plantation in temperate, tropical and subtropical regions.

Technological features: The variety has reached or topped the high yield and disease resistance performances of US varieties and offers competitive price advantages in the market.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use without training; inexpensive to use; and maintenance-free.

The variety has been put into pilot plantation in Southeast Asian countries such as the Philippines and Malaysia. It has also started to be promoted for use in the Philippines, with an annual plantation area of over 200ha.

Technology Provider

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42. Safe, high-efficiency tropical vegetable production technology

Technology overview

Functions and use: This technology can improve the year-round supply of tropical vegetables, enrich varieties and increase returns from plantations.

Technical information: Uses multiple-resistant and superior-quality vegetable varieties suitable for tropical eco-environmental conditions, integrates intensive breeding, water-saving irrigation, efficient water and fertilizer use, facility plantation and other advanced technologies, and can increase yield by over 20% and economic returns by 30% over traditional plantation techniques.

Scope of application: Suitable for tropical regions in the South Pacific island countries, Southeast Asia, Africa and Latin America.

Technological features: Simple technology, and high practicality; small investment, and high returns; and strong regional applicability and suitability for tropical regions.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; high up-front cost but low cost of use, and users can carry out their own maintenance.

Technology Provider

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Crop breeding

43. Sugar cane cross breeding technology and new sugar cane variety

Technology overview

Functions and use: (1) Mature sugar cane hybrid breeding technology and new sugar cane variety breeding technology; and (2) new sugar cane variety output, which increases yield for farmers and brings more economic returns to sugar companies.

Scope of application: Sugar cane breeding and planting countries and regions around the world. Especially applicable in Southeast Asian and African countries.

Technological features: Flowering induction is the foundation of the breeding of new sugar cane varieties. The promotion and application of new sugar cane varieties is an important technological basis for ensuring the renewal of sugar cane varieties and hence the sustainable development of the sugar cane industry.

Status of application

Has been promoted and applied; mature product; special training is required before use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

Every year since 2005, the technology provider has provided 10 new sugar cane varieties to the Philippines. In 2009, it dispatched technicians to offer sugar cane hybrid breeding technology training to sugar cane breeding personnel in Myanmar and conducted comparative experiments and the regional piloting of 5 sugar cane varieties. It has also provided new sugar cane varieties to Thailand and Cambodia.

Technology Provider

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44. Yunshu, a new potato variety

Technology overview

Functions and use: A new quality potato variety which can be used for chips and fresh vegetable. It achieves a chip quality equivalent to that of Atlantic Potato and can be used for chip processing.

Technical information: Plantation density: 3,500-4,000 plants/mu; domestic manure: 1.5t/mu(one Chinese mu is around 1/15 of a hectare) and compound manure: 100-150kg/mu, to be applied as base manure before plantation; improved mid-season tillage, weeding, irrigation, flood drainage and other field management measures; yield can reach 1.5-2t/mu, and commodity chip ratio: around 80%.

Scope of application: Suitable for plantation in Vietnam, Cambodia, Laos, Thailand, Myanmar and Southeast Asian countries.

Technological features: Yunshu 301 offers good chip quality, equivalent to that of Atlantic Potato; good adaptability, and high resistance to the latest epidemic diseases; and high yield. With low plantation cost and easy species transfer, Yunshu 301 can promote the development of the potato plantation industry in Southeast Asia.

Status of application

Can be put into commercial production in developing countries; simple training is required; low user cost; and maintenance-free.

Technology Provider

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Crop breeding

45. Superior quality watermelon, melon, eggphant, fruit and vegetable seeds

Technology overview

Functions and use: Seeds for agricultural production. The main varieties include tomato, eggplant, cantaloupe, broccoli, peppers, watermelon, cabbage and rape. These superior quality seeds can help improve local melon and vegetable plantation and raise a country´ s self-sufficiency in agricultural products.

Technical information: The tomato variety (Pu Hong 909) can produce big red round fruit, with a weight of 130~150g per fruit. After 15 days of storage on shelves, its quality fruit rate can reach 100%, while soluble solid matter content is at 4.6%. Seedling inoculation appraisal shows a physiological rate of high ToMV resistance, CMV resistance and high resistance to leaf mold disease. Spring plantation can produce a yield of over 5,000Kg/mu. Cross-winter, long-cycle plantation yield in contiguous greenhouses can reach 16kg/m^2. Hu Qie 2 is a hybrid eggplant variety with a high resistance to cold. It produces long fruits, with an average longitudinal diameter of 27.6cm, an average traverse diameter of 5.4 cm and an average weight of 209g per fruit. With good shape and purple skin, Hu Qie 2 eggplants are highly glossy and have green sepals.

Scope of application: The tomato variety (Pu Hong 909) is suitable for plantation on protective land and year-around plantation. Hu Qie 2 is a cold-resistant hybrid variety suitable for winter and spring plantation in greenhouses and protective lands and over long cycles.

Technological features: The tomato variety (Pu Hong 909) is characterized by strong growth, high purity, even-sized, high pass rate after cleaning and packaging and excellent field fruit setting performance. Its fruits are even in size and free from fruit shoulders and have a good color and taste. Hu Qie 2 is of an unlimited growth type and has a strong continuous fruition capacity. Its eggplants make a good commodity, are transportation-durable and boast excellent overall performance.

Status of application

Mature product; simple training is required; low use cost; and users can carry out their own maintenance.

Pilot planting has been successively carried out in modern agricultural demonstration zones in North Korea and the Seychelles. The variety grown in North Korea has an increased yield of 200% over local varieties, comes with high purity and are even-sized. The variety used in the Seychelles features high resistance to diseases, uniform fruits with an average weight of 160g and a soluble solid matter content of over 4.6%. With good performance, it increases yield by over 100% over local varieties and is very popular with the local population. A large number of superior quality melon and vegetable seeds have been provided to a big farm in Angola. These mainly include tomato, eggplant, cantaloupe, broccoli, peppers, watermelon, cabbage and rape seeds.

Technology Provider

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46. Mobile spray irrigation technology (SJP series mobile spray irrigation machine)

Technology overview

Functions and uses: the mobile spray irrigation system mainly consists of the pump station, water pipe, water supply hydrant and mobile spray irrigation machine and is generally suitable for land plots where the slope is no more than 25°, the investment per acre is RMB700-750, the effective utilization ratio of water is more than 85%, the irrigation uniformity is 85% and the service life of the machine is more than 8 years.

Technical indicators: Working pressure: 0.4Mpa, water spray volume: 28-39m3 / h, range: 34-44m, walking speed :0-60 m / h, irrigation efficiency : 3-9 acres / hour, uniformity ≥ 80-85%, power 15Kw, pump lift: 80m, whole machine weight: 280Kg

Application scope: may be used for large-area of field crops such as sugarcanes, pastures and maize as well as orchards, tea farms, and commercial trees. Moreover, it can be used for the maintenance of urban greening and sports ground lawns.

Features: Energy efficient, lightweight and practical, small size:

Status of application

The product has been put into use. Simple training is needed. The use cost is low. Maintenance by the customers is permitted.

Has launched 5000 acre mobile irrigation of sugarcane farms in Benin and Togo.

Technology Provider

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Agricultural machinery

47. Multifunctional flat die pellet mill

Technology overview

Functions and use: The mill is used to press into form all kinds of material particles, including fodder and forage pellets, organic manure, mixed organic and inorganic particles, wood chips, vinasse, fruit shells, straws and other biomass fuel particles, rubber and other particles.

Technical information: Production capacity (kg/h): depends on model and material, output: ≥800; total installed capacity (kW): depends on model; power:≥22; flat die diameter (mm): ϕ400, ϕ600, ϕ800 and ϕ1000.

Scope of application: Used for the granulation and formation of all kinds of industrial and agricultural wastes.

Technological features: One machine with multiple functions, wide range of applicable raw materials, and low water content and reduction ratio requirements for raw materials. Wide diameter roller, high output, high pellet rate, even pellets, and high pellet strength. Stable equipment running, low noise, good reliability, low fault rate and low power consumption per tonnage. A unique tangential discharge mode is adopted to effectively prevent pellet breaking. Automatic control, easy control and steering, low labor intensity and convenient maintenance and clearance. Overall casing cast, firm structure and equipped with heavy-duty thrust bearing to bear large axial loads. A forced lubrication system is adopted, which has a high and long service life. The roller and template are resistant to wear and have a simple structure. The template can be used on both sides. Supporting parts are cheap, and operating cost is low. Based on the needs, an adjustable speed feeder and steam conditioner may be fitted.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; simple training is required; low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established

Excellent use in Malaysia, showing reliable performance.

Technology Provider

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48. Feed extruder

Technology overview

Functions and use: This machine integrates raw material expansion and finished product expansion functions. By changing configuration, it can extrude Soybean meal, corn flour, rice bran, cottonseed meal, rapeseed meal, soybean meal, non-protein nitrogen (corn urea), fish meal, animal waste and other raw materials. In addition, it can also be used for pre-treating raw materials for oil and fat processing.

Technical information: power of main machine: > 75Kw; and yield: 1000-6000Kg/h.

Scope of application: various feed plants and breeding farms.

Technological features: Rational design, compact structure, outstanding performance, a wide-range of suitable raw materials, high efficiency, convenient adjustment and maintenance, low fault rate and easy operation; wearing parts are made of special wear-resistant alloy materials. Special consideration is given to develop multi-functionality. All major components enjoy greater strength and a longer service life; a removable durable bushing made of special materials is installed inside the extrusion chamber. Users do not need to replace the whole chamber, thus reducing component use cost. The bearing box and the rack are cast as a whole and equipped with heavy thrust bearings to ensure stable equipment running and a long service life; there is an optional iron-removing device to remove alien iron matter from feed materials; a double layer, heat insulated stainless conditioner can be used to regulate water and steam supply and produce better conditioning and extrusion effect; and a forced lubricating oil cooling and filtering system is adopted for the bearing box to prolong the bearings´ service life.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; simple training is required; low user cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

The machine has been well used in Indonesia, the Philippines among other countries.

Technology Provider

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Pest monitoring and control

49. Tropical agricultural and forestry pest (mite) pollution-free prevention and control technology

Technology overview

Functions and use: The tropical agricultural and forestry pest (mite) pollution-free prevention and control technology includes effective bio-pesticide target technology, physical and ecological regulation technology and mite-resistant variety breeding and utilization.

Scope of application: Tropical crops and forests.

Technological features: Environment-friendly, and sustainable for use.

Status of application

Can be put into industrial production in developing countries; ready for use after simple training; low cost of use, and users can carry out their own maintenance.

Technology Provider

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50. Mycorrhizal breeding technology

Technology overview

Functions and use: Arbuscular mycorrhizal fungi (AMF) is a microorganism in the rhizosphere. In symbiosis with the host plant, it has the effect of enhancing the host´ s absorption of P, K and other beneficial elements and improving salt drought tolerances. When used in the breeding of vegetables, fruit trees and other nurseries, it can increase seedling survival rates and reduce water and manure usage.

Technical information: The technology takes soil which contains high-infection-rate plant roots and mycorrhizal spores as the inoculation agent. High infection rate refers to the fact that the susceptible crop roots have a mycorrhizal infection rate of over 70%, an infection intensity of over 40% and a relative mycorrhizal rate of over 20%.

Scope of application: Nursery and organic plantation of horticultural and garden plants.

Technological features: (1) Improves the efficiency of water and manure usage under organic cultivation conditions in greenhouse soil, increases vegetable yield and improves the nutritional value of vegetables; (2) Enhances vegetables´ salt and drought tolerance and is suitable for use in saline soils. While reducing soil-borne diseases, it also significantly improves the root environment for vegetables.

Status of application

Has been promoted and applied; ready for use without training; inexpensive to use, and maintenance-free.

The South Valley University in Egypt has introduced this technology to breed vegetables and has improved local vegetable salt and drought tolerance, yield and quality. The technology is now under further promotion and application.

Technology Provider

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Soil amendment and fertilizer

51. Vegetable fertilizer, water and air integrated application device

Technology overview

Functions and use: The vegetable fertilizer, water and air integrated application device releases CO_2 gas fertilizer to greenhouse vegetables, and supplants fertilizer liquid, water and oxygen to their root system. When plants need irrigation and fertilizer, the fertilizer liquid can enter the drip irrigation system through a Venturi suction tube and promote plant growth.

Technical information: water saving, fertilizer saving, yield enhancement, resistance enhancement and vegetable quality improvement. It can increase a net income by RMB1,000-3,000 per mu (one Chinese mu is around 1/15 of a hectare) over conventional production and produce significant social, economic and ecological benefits.

Scope of application: This technology features low application cost, easy operation and wide raw material sources and can be promoted in greenhouses. It can be used in the plantation of vegetables as well as melons, strawberries and fruits. It can greatly improve vegetable yield and quality.

Technological features: (1)low-cost and easy CO_2 supply to greenhouses, improving vegetable yield and quality; (2)fertilizer can be directly supplied to vegetable roots to meet the vegetables´ fertilizer and water demand; and, (3) low-cost fertilizer and water application to vegetables, improving the effect of fertilizer and the vegetable root environment.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use without training; low cost of use, and users can carry out their own maintenance.

Technology Provider

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52. Compound organic and inorganic water-retention agent and water-retention fertizlier production technology

Technology overview

Functions and use: Agricultural water-retention agents can improve moisture use efficiency and increase crop yield. Meanwhile, this technology combines water-retention agents and fertilizers to develop water-retention, control fertilizer release and achieve integrated moisture and fertilizer control. In addition, it improves the efficiency of moisture and fertilizer use and notably improves agricultural output and returns.

Technical information: The compound organic-inorganic water-retention agent reduces acquisition cost by over 30% while retaining the same moisture retention performance (or with a fall of less than 10%). But, it improves salt tolerance and fertilizer retention and ensures integrated moisture and fertilizer control with the fertilizer as the carrier. Easy to operate, it can cut water and fertilizer use by 10-30%.

Scope of application: Agriculture, forestry, gardening and other plantation industries.

Technological features: This project breaks away from the current model of spatial separation between moisture and fertilizer and integrates moisture, nutrient supply and control into one body. It can make great savings on manpower and materials and achieve integrated moisture and nutrients under different spatial and time conditions.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; ready for use after simple training; low user cost; and users can perform their own maintenance .

Technology Provider

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Animal breeding

53. Buffalo cross-breeding technology

Technology overview

Functions and use: Use of the cross-breeding of superior quality milk-producing buffalos (by breeding bulls or frozen sperms) and swamp buffalos to improve milk production, improve milk-producing buffalos and thus increase economic returns in the buffalo industry.

Technical information: The first-generation swamp-type buffalo hybrids have an increased milk output from 500kg-800kg to over 1,300kg during one lactation period of their parents, while the second generation takes it to 1500kg-2000kg.

Scope of application: The buffalo industry.

Technological features: Notably improves the milk output of swamp buffalos and solves the problem of no breeding returns during most of the off seasons.

Status of application

Has been promoted and applied; simple training is required; high initial input cost but low subsequent use cost; and users can perform their own maintenance.

Technology Provider

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54. Incubation equipment

Technology overview

Functions and uses: Automatic equipment that provides suitable temperature, humidity and fresh air for incubation of breeding eggs of poultries and can be used for the incubation and hatching of chickens, ducks, geese, quails, ostriches, pigeons, and peacocks, swans.

Technical indicators: (1) egg capacity: 96 -90720 eggs; (2) temperature control range: 31.5-39.5℃; (3) temperature resolution: 0.10℃; (4) humidity control range: 40-80RH; (5) humidity resolution: 1RH; (6) egg turning angle: 45±2。

Application scope: Fully automatic hatching of various poultry eggs.

Features: The incubation equipment is capable of automatic control of the whole set of equipment heating system, fan stirring system, egg turning system, ventilation system and humidification system, collection of embryonic life information through various modules, embryo weight loss control, carbon dioxide concentration control and collection of embryo surface temperature to provide the best incubation environment and therefore achieve the best hatching results.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; low use cost, and users can carry out their own maintenance.

Technology Provider

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Animal breeding

55. Artificial fish seedling breeding technology

Technology overview

Functions and uses: Through the artificial breeding technology, induce the developed and mature broodstock to lay eggs and therefore acquire fish seedling of even size in large quantities for aquatic breeding.

Technical indicators: Build a set of fish seedling breeding facilities, including the broodstock cultivation pond, egg laying pond, hatching equipment and seedling cultivation pond; to maintain the egg laying rate, fertilization rate and hatching rate above 70% through the implementation of the whole set of technologies such as broodstock cultivation and selection, selection and injection of the spawning agent, induced spawning, artificial fertilization and hatching management.

Application scope: May be used for the breeding of a wide variety of major fish species.

Features: Optimize such technology procedures as broodstock cultivation, induced spawning and artificial hatching, control the main influencing factors during the procedures to increase the egg laying rate, fertilization rate and hatching rate, and therefore increase the seedling yield.

Status of application

Has been promoted and applied; mature product; simple training is needed; high initial input cost but low subsequent use cost; low use cost; maintenance-free.

International training classes have been carried out for more than 30 years, more than 1200 learners from over 90 countries have attended the training courses, and the technology has been put into use in some countries. For instance, in India, the fish seedling hatching facility is designed again, further technology improvements are made, the hatching rate reaches 90%, and the survival rate of the broodstock increases from less than 10% to more than 70%.

Technology Provider

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56. Artificial breeding and new rearing technology of tropical marine commercial shellfish

Technology overview

Functions and uses: The technology is a key technology for the rearing of tropical marine commercial shellfish, including the location of the rearing environment, microalgae culture, artificial breeding technology, rearing technology during different stages, prevention and control of disease. Depending on the status of shellfish resources of the coastal developing countries, the development and rearing technology of tropical marine shellfish of high commercial value may be chosen to turn it into an effective industry of economic growth. The tropical marine commercial shellfish mainly include scallops, abalone, oysters and clams, etc, which can be a main source of protein for the coastal developing countries.

Technical indicators: (1) the survival rate of culturing juvenile (2-3cm) is above 30%; (2) the survival rate of culturing juvenile is above 60%; (3) The growth speed increases by at least 15%.

Application scope: Suitable for tropical coastal or island developing countries, especially countries that abound in tropical marine shellfish resources. The shellfish species include scallops, oysters, abalone, giant clam etc., and the tropical developing countries that take the breeding of tropical shellfish as the source of protein, process and export the tropical shellfish.

Features: The technology is a key technology for artificial breeding and rearing is practical, cost-effective and may generate returns rapidly.

Status of application

The technology may be industrialized in the developing countries. Special training is needed. The use cost is low. Training of the maintenance personnel or establishment of maintenance points is needed.

Technology Provider

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Food processing

57. Potato processing technology and small-and-medium sized processing equipment sets

Technology overview

Functions and use: Potato processing technology and equipment mainly include starch and refined starch processing (including fast food vermicelli and miscellaneous fast food grain bean vermicelli), small food processing (including biscuit, non-fried baked food, fried chips, compound chips, and low temperature, vacuum chips), instant noodle processing, and total vermicelli and its application product processing. Such technology and equipment can be widely used to process such potato crops as sweet potato, potato, canna and cassava. In the food processing field, the technology and equipment can be used with rice, maize, wheat and vegetables to develop all kinds of highly adaptable nutritious and health-enhancing products.

Technical information: Sweet potato and potato starch whiteness can respectively reach 70% and over 85%.

Scope of application: Various types of small foods produced from fresh potatoes and total starch can be used as a full variety of feature food and convenience foods. Potato starch and its variants are widely used in the processing of instant vermicelli, instant noodles and baked food as well as in the paper-making, textile, pharmaceutical and agricultural fields. Total starch is an important basic raw material for food processing and food making.

Technological features: This technology features a close combination of varieties, agricultural production, preliminary






processing and deep processing. It has been successfully promoted and used and offers such features as small investment and fast returns.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use, and users can carry out their own maintenance.

The technology provider has transferred 6 sets of potato starch vermicelli processing machinery to North Korea, all with good application and effect.

Technology Provider

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58. Jun-cao (mushroom) technology

Technology overview

Functions and use: Use Jun-cao (mushroom) to plant edible fungi and medicinal fungi and produce fungal feed and fungal manure, and develop a new green industry — the Jun-cao industry; ″using grass to replace wood″ to change the traditional edible and medicinal fungi plantation practice and fungal industrial development model, organically combine fungal production with environmental protection, and achieve the sustainable development of the fungal industry; develop Jun-cao fungal feed and fungal manure, and expand ways to utilize Jun-cao and fungal waste; research and develop deep processed products from Jun-cao medicinal fungi, and push forward the development of the medicinal fungi industry; breed and plant special superior quality Jun-cao, and provide quality grass species and plantation technologies for conserving soil and water, improving soil fertility and preventing land desertification; and, provide superior quality raw materials and integrated technologies for developing biomass materials (compound fiber board materials, pulp and so on) and biomass energy.

Technical information: (1) One hectare of Jun-cao can produce 270-333kg of fresh mushrooms. Jun-cao plantations of edible fungi and medicinal fungi have a short production cycle. (2) Edible fungi grown on Jun-cao has a high coarse protein content as well as other nutritional ingredients and a heavy metal content noticeably lower than that specified in the international standard. (3) Jun-cao has a soil-holding capacity 15 times higher than that of agricultural crops. In the Jun-cao plantation region, summer ground temperature at noon can be 10-15℃ lower, humidity up by around 30%, surface runoff down by 30% and soil erosion

Other

down by 78%. Each year, it can reduce soil loss by 300kg/ha and absorb 400kg/ha of carbon dioxide. And, (4) high-yield Jun-cao has a biogas output of 548 m^3/t (including 55% of methane), with a calorific value of 3,800-4,000Kcal/kg. One hectare of high-yield Jun-cao is equivalent to the power output of 230-260kg of raw coal.

Scope of application: The technology can be used in mountainous regions where there are D. dichotoma, Neyraudia reynaudiana, Miscanthus, reed and other wild Jun-cao or regions where there are elephant grass, broad leaf paspalum, Alfalfa, Clover Series or stalks (waste). It is mainly applied in the fields of edible fungi, medicinal fungi, health food, biomedicine, fungal feed, biological manure, biomass materials, soil and water conservation and desert control.

Technological features: Change traditional plant-animal dual agriculture into plant-fungi-animal tripartite agriculture, organically combine social, economic and ecological effects together, develop a circular economy and create the Jun-cao industry, a new high-yield, superior-quality, and high-efficiency ecological industry.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after special training, inexpensive to use, and users can carry out their own maintenance.

Currently, the technology provider has established or is setting up Jun-cao technology cooperation bases in Rwanda, Papua New Guinea, Lesotho, South Africa, Fuji and other countries, with a total investment of RMB181 million. Among them, it has been successfully promoted and applied in Papua New Guinea, Rwanda, South Africa and Lesotho. The Jun-cao industry has become an important industry for increasing local quality food supply, creating job opportunities, reducing poverty, improving the ecological environment and developing the agricultural economy, attracting high attention from local governments and international organizations. The technology provider has also trained 1,144 students from 80 countries on 6 continents.

Technology Provider

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South-South Cooperation on S&T to Address Climate Change

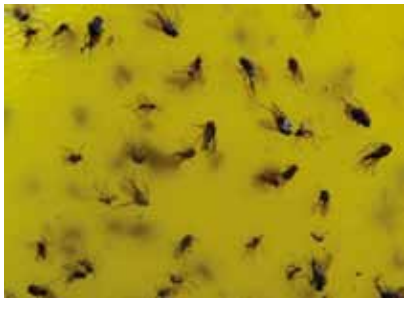
Applicable Technology Manual

Forestry technologies

Forests are critical carbon sinks on earth. They can clean the air, preserve water, protect bio-diversity and increase incomes for the poor. In the past ten years, 13 million hectares of forests are destroyed each year due to human activities or natural causes. To nurture and protect forests can facilitate sustainable development of every country.The technologies for forestation, afforestation, bamboo utilization and forest management will play an important role in the protection, rehabilitation and appropriate use of forests.

Pest monitoring and control

59. Non-Poisonous insect glue and its application technology



Technology overview

Functions and use: Use non-poisonous insect glue to make various insect glue boards, traps and catchers, combine it with colors or attractants to dynamically monitor, prevent and control pests.

Technical information: (1) Control crawling pests on tree trunks, such as pine caterpillar Drosicha Kuwana, with a control effect of over 90%; (2) Control pests with color preferences, such as fungus gnat, delia and aphids, with a control effectiveness rate of over 90%; and (3) in combination with attractants, control boring pests, such as Golden Delicious apple fine grain moth and pear moth, with a control effect of over 80%.

Scope of application: Various kinds of crawling and flying pests

Technological features: Non-poisonous, harmless, low cost, convenient to use, and suitable for pest control in organic food production bases.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training, inexpensive to use, and maintenance-free.

The technology has been transferred to and widely used in Iran, Japan, South Korea and Saudi Arabia.

Technology Provider

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60. Rubber tree pest integrated control technology

Technology overview

Functions and use: Integrated control of rubber tree pests.

Technical information: Integrated rubber tree pest control system for different growth stages; pest monitoring and forecasting; level of economic damage; control indicators and compound control indicators.

Scope of application: Rubber tree pest control in tropical regions.

Technological features: (1) Increases control effect by 10.5% and economic returns by 21.3% and lowers control costs by 20.5% over conventional methods. Meanwhile, saves pesticide usage. (2) Establishes rubber anthracnose, root disease and brown skin disease forecast models, hazard loss estimation models and control indicators. Average pest forecast accuracy: > 88%, and can offer effective disease control guidance; and (3) Ju Ling, an efficient chemical pesticide powder which can concurrently control rubber powdery mildew and anthrax and Xiu Ning, a pesticide which can control several root diseases and powdery mildew, have been developed and produce better control effects than conventional pesticides.

Status of application

Can be put into commercial production in developing countries; special training is needed; high initial input cost but low subsequent use cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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Pest monitoring and control

61. Jiaduo solar frequency oscillated insecticidal lamp

Technology overview

Functions and uses: The solar panel converts light into electricity, and outputs safe voltage, which saves the energy and power and is cost-effective. The product provides the areas that were forced to give up pest trapping and killing with lamps due to shortage in power supply previously with an advanced prevention and control tool.

Technical indicators: (1) control area (acres): 60-80; (2) storage battery: 12V / 24AH; (3) service life (years): 10-15; (4) Solar panel: monocrystalline silicon 40W; (5) impact area (m2): 0.2--0.46.

Application scope: The lamp can be widely used in agriculture, forestry, vegetables, tobacco, warehousing, wine brewing, garden, orchard, urban landscaping, aquaculture, especially in the areas affected by thee bollworm. It can trap and kill 1287 kinds of pests: ① soil pests: Beetle, mole crickets, cutworms; ② rice pests: rice stem borer, yellow rice borer, rice borers, plant hoppers, leaf hoppers; ③ cotton pests: Cotton bollworm, tobacco budworm, pink bollworm; ④ vegetable pests: Diamondback moth, vegetables borer, beet armyworm; ⑤ fruit pests: Borer, smoking fruit moth, peach punctiferalis; ⑥ forest pests: Pine moth, moth, fall webworm, satin moth, Anoplophora glabripennis, spring looper, pine beetles and other 1287 kinds of pests.

Features: 1. solar power source that is energy efficient and environmental friendly; 2. Advanced ecological safety feature: kill the harmful pests and protect the useful pests to maintain the balance of the ecological system; 3. unique frequency oscillated insecticidal lamp. The technology is granted national utility model certificate, patent number: ZL02213023.3. It is the sole frequency oscillated patent technology protected by the patent law of China.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; no training is needed; low use cost; high initial input cost but low subsequent use cost; users can carry out their own maintenance.

Technology Provider

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62. The comprehensive control technology of banana wilt

Technology overview

Functions and uses: Explore methods of pathogen removal or reduction in the disease area according to the relationship between the pathogen, host, environment and disease. Through soil improvement, changes in soil C, N ratio and pH, etc, create the ecological and environmental conditions that are conducive to the growth of banana but are not favorable for the occurrence of banana wilt, select the disease resistance varieties, try safety and reliable chemicals at proper times during the early stage of the disease, enhance water and fertilizer management, divert clean water source to implement low –pressure micro spray irrigation, reform the farming practice and implement scientific cultivation to reduce the incidence and spread rate of banana wilt significantly and achieve good socio-economic benefits.

Technical indicators:1、virus affected plant killing technology; 2、soil improvement technology that reduces the amount of pathogens in the virus affected soils；3、disease-resistant banana varieties screening; 4. chemical control techniques;5. Establishment and demonstration of comprehensive banana wilt control technology.

Application scope: applied to banana wilt disease prevention and control.

Features: reduce the incidence and spread rate of banana wilt.

Status of application

The technology has been put into use. Simple training is needed. The use cost is low. Training of the maintenance personnel or establishment of maintenance points is needed.

Technology Provider

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Forest management, plantation, tree variety breeding

63. Technologies of bamboo cultivation and comprehensive processing and utilization

Technology overview

Functions and use: Through reconstructing natural bamboo forest or new bamboo forest, implement categorical bamboo forest operations and directional nurturing and improve the business goals and returns of bamboo forests: bamboo forests for medicinal and edible uses with the goal of getting maximum economic returns; and, conservation of bamboo forests, water-nurturing of bamboo forests, soil and water conservation of bamboo forest and carbon sink of bamboo forest with the goal of get maximum ecological benefits. Processed bamboo products include both traditional daily use products and industrial integrated processing and utilization products with higher added values, such as bamboo plywood, bamboo flooring, bamboo matting, bamboo shoots, bamboo charcoal, bamboo paper and bamboo biomass energy.

Scope of application: Developing countries in Asia, Africa, Latin America and the South Pacific

Technological features: The technology is simple, easy to learn, feasible, practical and cheap. It supports forestry to form an integrated system of plantation, processing, industry and market. In particular, the timber processing and utilization technology provides users with rich and diversified world product and helps them to solve livelihood problems, reduce poverty and create wealth. It is very suitable from a practical point of view in developing countries.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after special training, inexpensive to use, and users can carry out their own maintenance.

The bamboo plantation, processing and utilization technology has been promoted and applied in Rwanda, Uganda and Kenyan in Africa, Brazil, Argentina and Mexico in Latin America, Vietnam and India in Asia and Fuji in the South Pacific. Good results have been produced.

Technology Provider

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64. Organic light medium processing and mass Propagation of seedling technology

Technology overview

Functions and uses: To manufacture organic light medium for forest seedling production and flowers and vegetables plantation by means of agricultural and forestry wastes, such as bark, sawdust, straw, fruit skin and core, etc., using fast and efficient fermentation of microbial agents. In the meanwhile, the biodegradable nursery containers - non-woven, paper pulp cup (plug) may be used to cultivate good seeds with well developed and balanced root systems.

Technical indicators: rapid processing technology of organic medium of forestry wastes :1）the organic matters decompose more than 150% times faster than the traditional compositing process, the rate of loss of the organic matters is reduced by 40% folds, and the processing cost is reduced by 15-20% folds. 2）light organic substrate cultivation techniques of tree seedlings: determine the formula for cultivating the organic medium according to different seedling specifies ; the degradation rate of the nursery container exceeds 95%, and the root system of the seedlings is more than doubled.

Application scope: Can be used for organic substrate culture and factory production of tree seedlings, flowers and vegetables.

Features: 1. Effective solve the problem of environmental pollution caused by agricultural and forestry wastes and increase the utilization ratio of resources; 2. Replace peat

soil to meet the needs of factory-based seedling cultivation and flowers/vegetables for organic substrate; 3. Through nursery with light organic substrate and degradable nursery containers,the root system of the seedlings is well developed and balanced, and the seedlings are transplanted directly with the containers without the rejuvenation period.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; low use cost; users can carry out their own maintenance.

Technology Provider

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Forest management, plantation, tree variety breeding

65. Coffee varieties and plantation technology

Technology overview

Functions and use: Drought- and rust-resistant fine coffee variety and high-yield and high-efficiency plantation technology. Through building high-efficiency, high-yield coffee gardens, it is possible to achieve substitution plantation, beautify the environment, reduce soil and water loss, increase job opportunities and income.

Technical information: The coffee variety is drought and rust resistant. The technologies include: coffee breeding technology, manure application technology, coffee garden field management and pest control technology, and preliminary coffee processing technology.

Scope of application: Suitable for tropical countries, especially tropical countries in South Asia and Southeast Asia.

Technological features: This technology is suitable for plantation in mountainous regions. It does not compete for land with grain production, thus not affecting grain security. Easy to grasp, the technology is suitable for industrialized plantation and development in developing countries.

Status of application

Has been promoted and applied; simple training is needed; high initial input cost but low subsequent use cost; and maintenance-free.

Technology Provider

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66. Plantation and utilization technologies for Euphorbia Tirucalli (milk bush) Forest

Technology overview

Functions and use: Milk bush is a fast-growing organic energy tree species which contains rich hydrocarbon-type inflammable organic matter. It is suitable for development in tropical and southern subtropical regions. Its leaf liquid can be used to produce biological diesel fuel or serve as a raw material for biogas fermentation. With a high biogas production capacity, it can be used in rural energy development programs in developing countries.

Technical information: Milk bush has an annual biomass output of 45 tons/ha. Used for biogas production, this can generate 6,300m^3 of biogas a year, equivalent to an annual power output of 10,647WKh.

Scope of application: Suitable for national rural energy forest farms in tropical and southern subtropical regions.

Technological features: Milk bush is drought-resistant. By combining high output (biogas) tree species plantation with biogas utilization, it is of great significance in solving rural energy problems in poor countries in Africa and Asia. Milk bush is easy to grow and manage, while biogas technology is also a mature technology. Their combination will offer milk bush notable advantages in practical use and promotion.

Status of application

Can be put into commercial production in developing countries; simple training is needed; low use cost; and users can perform their own maintenance.

Technology Provider

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Forest management, plantation, tree variety breeding

67. Forestry and vegetation restoration technology for arid regions

Status of application

Has been promoted and applied; ready for use after special training; low user cost; and users can perform their own maintenance .

Technology Provider

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Technology overview

Functions and use: Drought is a worldwide problem. Semi-arid and arid regions accounts for 1/3 of the total land area in the world, covering over 50 countries and regions. Vegetation restoration has long been a difficult issue in ecological reconstruction. Almost 60 years of research has led to an effective solution to the problem of low vegetation survival rate and formed serial supporting technologies.

Technical information: Forest survival rate: > 80%; and three-year vegetation retention rate: 75%.

Scope of application: semi-arid and arid regions.

Technological features: Rational supporting technologies, simple operation, low cost and high success rate.

Forest management, plantation, tree variety breeding

68. Desert shrub drought resistance evaluation system and fine variety breeding technology

Technology overview

Functions and use: Shrub tree species play an important role in sustaining the stability of desert ecosystems. The technology provides a theoretical basis and technical means for vegetation restoration in semi-arid and arid desert regions with an annual rainfall of under 300mm.

Technical information: The indicators of this technology include: (1) Establishment and evaluation of a drought resistance indicator system for shrub tree species, including integrated testing and evaluation at morphological, physiological and molecular levels; (2) seed garden construction and management techniques; and (3) fast seedling breeding and quality evaluation techniques.

Scope of application: The technology applies to semi-arid and arid desert regions with an annual rainfall of under 300mm.

Technological features: Has created standardization and technological systems for desert shrub anti-drought mechanisms and evaluation and seed garden construction and fast breeding, offers major social, economic and ecological benefits, and can be promoted in developing countries on a large scale.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is needed; low use cost; and maintenance-free.

Technology Provider

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Forest management, plantation, tree variety breeding

69. Hole enclosure method-based water-saving and drought-resistant fixed seedling plantation technology

Technology overview

Functions and use: water-saving, plant hole micro-environment-improving, suitable for fixed seedling plantation in regions experiencing seasonal droughts.

Technical information: cuts water consumption by 50%, and fixed seedling survival rate is over 96%.

Scope of application: Fixed seedling plantation and afforestation in seasonally arid regions.

Technological features: Water- and labor-saving, high survival rate and zero pollution.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; low use cost; and maintenance-free.

Technology Provider

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70. Shoulder-rocket extinguisher system for forest fire

Technology overview

Functions and use: Used for putting out forest surface fires and can project extinguishing agents to fire sites within a range of 200m. The rocket system disperses high-efficiency extinguishing agents via explosion so as to stop burning chemical reactions and suffocate and put out fire.

Technical information: Projectile diameter: 105mm; combat part length: 530mm; total shell weight: 5.2kg; effective range: ≥200m, and 500m after extended range; extinguishing agent carrying load: ≥2.5kg; launch pre-parathion time: ≤1min; control area ≥50m^2; rocket launcher length: 920mm; rocket launcher´ s total combat mass: 11kg (1 launcher + 1 shell); and initial speed: 60m/s.

Scope of application: Applicable to putting out forest surface fires and while ensuring personal safety, can accurately project dry powder to the fire front and rapidly extinguish fire which cannot be reached by humans.

Technological features: Shoulder-launched, mobile, accurate within 1m over a distance of 200m; safe and self-destruction device attached.

Status of application

Mature product; ready for use after special training; low user cost; and users can perform their own maintenance .

Technology Provider

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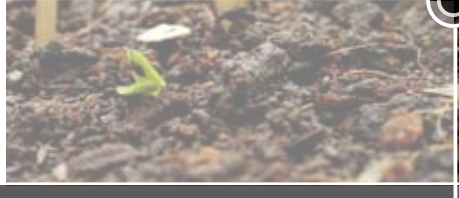
South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual



Waste utilization technologies

Wastes are resources put in the wrong place. In the industrialization and urbanization process, developing countries will produce huge amounts of agricultural, industrial and domestic wastes. The disposal of waste takes up much valuable land, pollutes the environment, damages human health, and also causes loss of resources. The R&D and application of technologies for agricultural waste utilization, garbage compost and waste incineration is important for turning waste into wealth.

71. Greenhouse vegetable cultivation with organic substrate by agricultural waste

Technology overview

Functions and use: This technology, using agricultural waste to develop organic substrate, can be applied in vegetable seeding and cultivation.

Technical information: With this technology, it is expected to increase net income of vegetable production by RMB2000-5000 per Mu (one Chinese Mu is about 1/15 of a hectare).

Scope of application: The technology disposes a wide array of agricultural wastes for organic soil. It is easy to apply and could be promoted in most rural areas.

Technological features: vegetables produced by the technology are guaranteed to meet green food standards with substantially reduced nitrate and improved nutrition. The technology has realized quality and sustainable vegetable production.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; low use cost; and easy self-maintenance.

Technology Provider

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Agricultural waste utilizaiton

72. Technology set for environment-friendly separation of crop straw cellulose




Technology Overview

Functions and use: Using environment-friendly technical methods, extracts green natural fiber materials, and develops set technologies with high added values. Natural cellulose materials can be used to make high-class regenerative fibers for textile purposes and can be decomposed to get the fuel ethanol, or be used to produce high-performance composite materials; after cellulose extraction, straw lignin and hemicellulose can be recycled and reused in the making of composite materials (such as light green building materials, wood-substituting packaging materials and fully degradable composite materials), biofuels and organic manures.

Technical information: (1) Extracted straw cellulose purity: ≥95%, cellulose polymerization: 300～1200, and meets requirements for continuous spinning; (2) lignin grain size: ≤50 μm; and (3) extraction solvent recycling and reuse rate:≥98%;

Scope of application: This technology can be promoted in all regions with rich straw resources.

Technological features: (1) Ultrasound wave and microwave-assisted subcritical flash explosion technology and green extraction technology for extracting cellulose from crop straws; (2) technology for suing straw cellulose to make regenerative green fiber products; (3) technology for recycling, modifying and utilizing lignin, hemicellulose and other non-cellulose ingredients from straws.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; simple training is needed; low use cost; and users can perform their own maintenance .

Technology Provider

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73. Equipment and technology for medium-density board production with crop residues

Technology Overview

Functions and use: Through cutting, crushing, drying, sizing, paving, hot pressing, cold plating, trimming and sand polishing processes, this technology turns crop straws into medium-density artificial boards which are widely used in interior decorations, furniture making and vehicle and ship repair.

Technical information: Annual output: 15,000-80,000m^3; thickness: 8-25mm and main performance indicators meet the requirements of China´ s national standard GB11718.

Scope of application: This technology can process crop straws such as wheat stalks, rice straws and corn stalks, shrubs such as Salix, Caragana and date palm and other tropical plant species to produce medium-density boards. It is suitable for building new artificial board plants or expanding artificial board plants which take straws and other plants as the raw materials.

Technological features: By using crop waste as the raw material, this technology both solves the problem of environmental pollution caused by straw treatment and increases farmers´ income. The material preparation process requires no hot grinding and can separate star fibers at normal temperatures; use a flash-type tube dryer and offer high efficiency and low production and operating cost; use green PMDI rubber technology and advanced production processes and release no formaldehyde; computer control ensures fully automatic production line operations; and saves power consumption by 50% over wooden artificial board production lines of similar sizes.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is required; low user cost; high initial input cost but low subsequent use cost; and users can perform their own maintenance .

Technology Provider

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Agricultural waste utilizaiton

74. Bagasse boiler

Technology Overview

Functions and use: The boiler features high efficiency, energy saving, environmental friendliness and comprehensive use of waste resources. It not only solves the bagasse-induced environmental pollution problem that has long troubled sugar-making enterprises and provides part of the electricity used by the sugar plants but also generates dust which contains 10% of potassium, which meets the standard for potassium fertilizer production. Each year, a large amount of green organic potassium fertilizer can be collected to meet agricultural production needs. Meanwhile, the power output from the burning of every 2 tons of bagasse is equivalent to the power output of 1 ton of standard coal. Bagasse only contains 1/10 of coal′ s sulfur content. Bagasse boilers not only save a large amount of valuable coal resources but also effectively reduce SO_2 emissions.

Technical information: Boiler′ s evaporation: 10-130t/h; steam pressure: 1.28-9.8MPa; superheated steam temperature: 450-540℃; boiler′ s thermal efficiency: 85.9%.

Scope of application: Use of sugar cane residues from various sugar making enterprises.

Technological features: The boiler combines a ″chamber burning + layer burning″ mode and a corner-tube boiler layout to ensure that sugar making enterprises can effectively use bagasse in the sugar cane grinding season and coal in the non-sugar cane grinding season, thus improving boiler efficiency. The corner-tube boiler layout lowers steel consumption and helps the promotion and application of the boiler. It also ensures reliable boiler sealing and reduces the impact of air leakage on boiler burning. It effectively eliminates temperature fluctuations in the boiler chamber when ash is blown, brings the heated surface to work in a clean mode and improves heat transfer efficiency.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is required; low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Has been used in Mali.

Technology Provider

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75. Recycling use of valuable metal resources from copper slag

Technology Overview

Functions and use: The technology can effectively recover various valuable metal resources from copper slag, and use residual slag in building materials. The technology effectively recycles various valuable metals from copper slag and promotes the sustainable development of the metallurgical industry. It can also turn residual slag into building materials and solve the serious environmental problem caused by large-scale copper slag dumping.

Technical information: Iron resource recovery ratio: 70%; copper resource recovery ratio: 65%; and other valuable metal resources can also be effectively recovered.

Scope of application: The technology is applicable to copper slag generated in the copper melting process, and can be gradually extended to other nonferrous slag.

Technological features: Simple work processes, and economic and rational technology

Status of application

The technology can be put into industrial production in developing countries; ready for use after simple training; high initial input cost but low subsequent use cost; and users can carry out their own maintenance.

The producer has reached a technology transfer agreement with a company in Viet Nam to effectively recover iron and copper resources from copper slag.

Technology Provider

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Industrial waste utilization

76. Technology and equipment for waste oil recycling

Technology Overview

Functions and use: The technology and equipment can be used for the regeneration and purification of transformer oil, insulating oil, lubricating oil, hydraulic oil, turbine oil, fire-resistant oil and engine oil. By achieving online oil filtering and restoration of waste oils to their use function, the technology and equipment can save a lot of fuel resources, ease oil supply shortages and play a notable role in energy conservation and emission reduction.

Technical information: Oil product´ s residual water content: 2-50 μg/g; breakdown voltage: 60-80kV; filtering precision: 3/5/10 μm; acid value: 0.03mgKOH/g; PH value: 5.4; media loss: 0.02%. The recovered product meets specified operating oil quality indicators.

Scope of application: The technology is suitable for the recycling, regeneration and reuse of various kinds of industrial waste oil from power plants, grids, manufacturers, auto makers and repair plants, mining, metallurgy, chemical industry, transportation, agriculture, oilfields and nuclear power plants.

Technological features: The technology adopts the latest processes, and includes all the advantages of the vacuum method, the centrifugation method, the condensation method, the absorption method and pressure filtration. It features high efficiency, high level of automation, simple operation, high recovery rate, online operation and low maintenance cost.

Status of application

mature product; ready for use without training; inexpensive to use; and users can carry out their own maintenance.

Many years of use in the National Power Company of Malaysia, Chashma Nuclear Power Plant in Pakistan, JSL Turbine Island Power Plant in Nepal, the Nam Dinh Power Supply Bureau and Hai Phong Power Plant in Viet Nam. Stable performance, good effect and low failure rate.

Technology Provider

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Landfill, incineration and composting of waste

77. Integrated treatment of urban solid waste

Technology overview

Functions and use: (1) Integrated urban solid waste treatment system, including a sanitation landfill system, a burning-fired power generation system and composting system; (2) biogas power generation system that uses biogas generated from the sanitation landfill and composting systems; (3) low energy-consuming leachate treatment system. It can carry out harmless treatment of waste, condense liquids and make manure.

Technical information: (1) The leachate treatment system saves energy by over 30%; (2) the burning-fired power system generates over 250KWh of electric power per ton of waste.

Scope of application: The technology can be widely used in the urban solid waste treatment field.

Technological features: Beijing Environmental Sanitation Engineering Group-Environmental Research and Development Co., Ltd. boasts R&D abilities for advanced integrated urban solid waste treatment, energy conservation and emission reduction. Its various integrated treatment, energy conservation and emission reduction technologies have been widely used in China and other countries.

Status of application

The technology has been promoted and applied; can be put into commercial production in developing countries; mature product; ready for use after simple training; high first-time input cost but low subsequent use cost; and users can perform maintenance on their own

The technology provider has reached cooperation agreements with Pakistan, Cambodia, Indonesia, Cuba and Nigeria to provide them with integrated domestic waste treatment, energy conservation and emission reduction technology and assist in training local enterprises in the operation and management of treatment facilities. Its products and services have been exported to Pakistan, Cambodia, Cuba and other developing countries.

Technology Provider

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Landfill, incineration and composting of waste

78. Circulating fluidized bed boilers burning coal and biomass

Technology Overview

Functions and use: Biomass is a renewable energy. Co-combustion of coal and biomass in boilers offers a fast and low-cost biomass power generation technology for existing power plants. It is also the best, cheapest and lowest-risk technology to use renewable energy to generate power. Biomass is a low-sulfur and low-nitrogen fuel with good ignition and burning properties. Co-combustion of biomass and coal in boilers is a simple technology with low investment and operating expenses. The technology can reduce existing coal-fired power plants´ CO_2, SO_2 and NOx emissions, offering notable social benefits.

Technical information: Rated evaporation: 35-220t/h; rated steam pressure: 3.82-9.8Mpa; rated steam temperature: 450-540℃; biomass fuel mixture ratio: 0-50%; boiler´ s thermal efficiency: 87-92%; applicable biomass types: sawdust, bark, palm shell, coconut shell, animal manure, stalks and so on.

Scope of application: The product can be widely used in paper making, chemicals, dyeing, municipal construction and animal husbandry industries.

Technological features: High fuel applicability and ability to mix a variety of biomass fuels; low sulfur and nitrogen oxide emissions, and easy to achieve desulphurization and denitrification inside boilers; stable operation under 30-100 loads can be ensured within the load adjustment range; low technical risks, and the effective prevention of pure biomass fuel-fired boilers´ high temperature corrosion, furnace coking, difficult stable fuel supply and other problems.

Status of application

The technology can be put into industrial production in developing countries; mature product; special training is needed before use; low cost; and maintenance personnel need to be trained or a maintenance station needs to be established.

To take full advantage of the rich local biomass resources in Indonesia, a 35-220 ton/h circulating fluidized bed boiler burning coal and biomass waste has been developed. Its sales revenue has reached $21 million.

Technology Provider

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Landfill, incineration and composting of waste

79. Microbial manure fermented with livestock excrement

Technology Overview

Functions and use: Livestock excrement generated from animal-raising district can turn into non-smelly and harmless manure or biological control manure by aerobic microorganism fermentation. The technology can convert waste from animal husbandry into plant industry manure.

Technical information: (1) Manure Appearance: brown or black brown. (2) Odor: smelless or aromas from fermentation, non-smelly. (3) Component Index: Nitrogen≥2%, Phosphorus≥0.2%, potassium≥1%, Organic Matter≥40%. (4) Probiotics Indicator: Probiotics≥100 million/g. (5) Beneficial Material: various enzyme and nutrient needed by plant, eg. amino acid, crude protein, nucleic acid, vitamin, growth regulator and antibiotic.

Scope of application: widely-used for treatment of organic wastes such as livestock excrement, crop straw, brewing wastes and organic garbage into hazard-free and reclamation.

Technological features: (1) muti-microorganism mixed: Filamentous fungi, Yeast, Actinomycetes and Bacterium are mixed together to generate synergistic effect during fermentation. These microorganism can utilize organic wastes as nutrientsource to grow and breed, and organic wastes can be hazard-free and reclamation by powerful biochemical reaction. (2) Powerful function: When dealing with common livestock excrement at above 15℃ with this technology, its temperature of can rise to about 50-60℃ in 48 hours, and can maintain 55-65℃ after turning over and mixing, sometimes can reach 75℃. Deodorization, thoroughly decomposed, desinsection and sterilization can be accomplished at such high temperature within 10 days to 15 days. The process reflects powerful biodynamics of probiotics.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; low use cost.

Technology Provider

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Landfill, incineration and composting of waste

80. Organic solid waste aerobic composting technology

Technology Overview

Functions and use: Under aerobic conditions, degrades the organic matter in animal and plant residues and generates simple and stable products, and makes organic solid waste harmless and contains rich humus. The technology can be used in agricultural production and helps to preserve organic matter in the soil.

Technical information: (1) maximum composting temperature: >50～55℃, lasting for 5~7 days; (2) Roundworm egg mortality: 95-100%; (3) fecal coliform level: 101-102; (4) effective control of fly breeding, no maggots, pupae or newly emerged adult flies around composting site; (5) seed germination index: 80%.

Scope of application: Fowl and livestock excrement, crop straws, urban domestic waste, waste and sludge from meat processing plants, including meat processing factories, tanneries and slaughter houses.

Technological features: (1) Shortens the composting cycle from 1-2 months for traditional composting to 1~2 weeks; (2) combines biotechnology and technical equipment technology. In other words, integrates technologies and equipment in order to optimize the mixing of raw materials, external source inoculation and process control (such as ventilation and compost turning), thus strengthening the role of composting microorganisms; and (3) unifies the multiple goals of fast degradation, reduction of nutrient loss, reduction of odors and improvement in product quality. It achieves the harmless treatment of fowl and livestock excrement, ensures product quality and provides benefits and a win-win situation for both environmental and agricultural production.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is needed; low use cost; and users can perform their own maintenance .

Technology Provider

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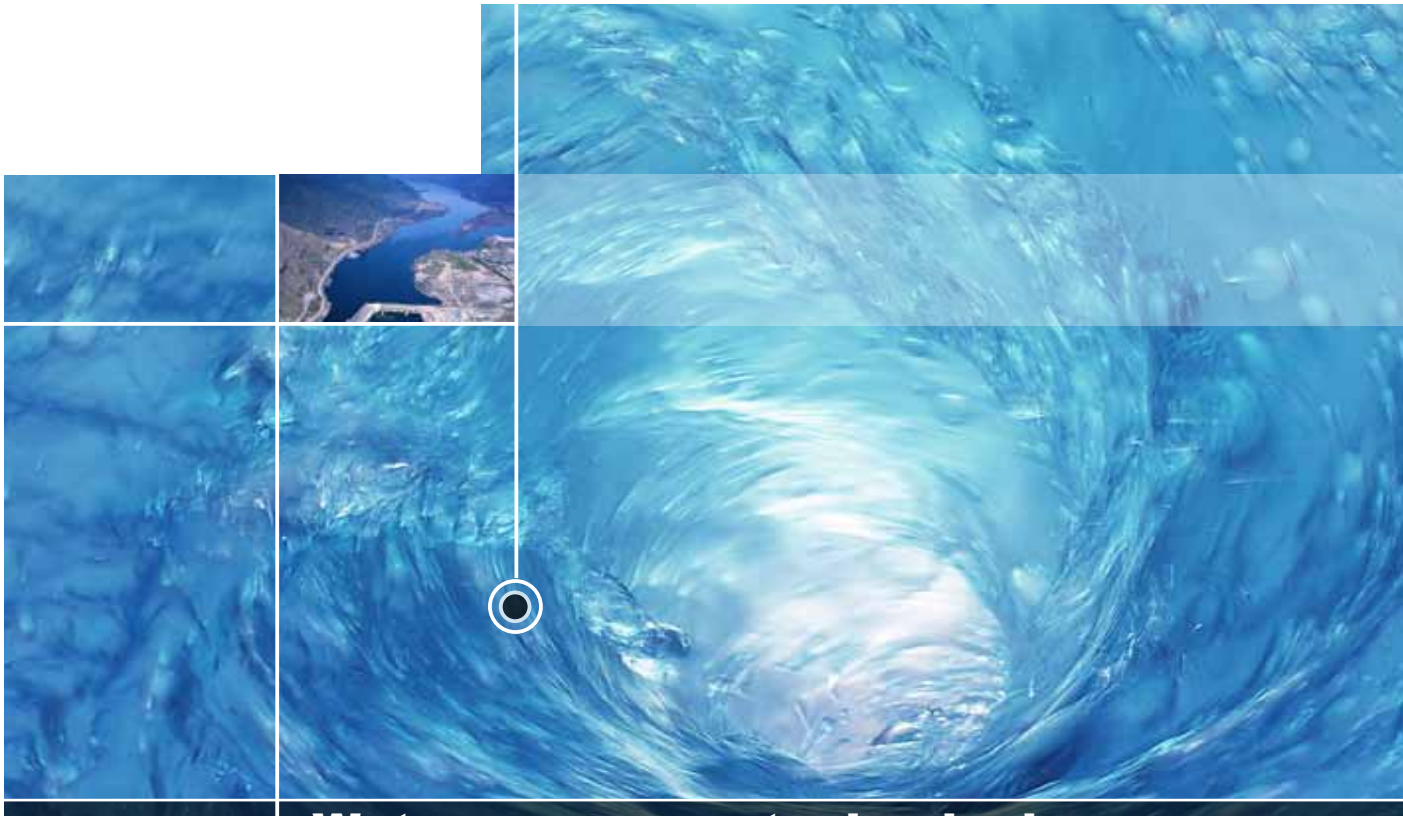
South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual



Water resources technologies

Nothing can live without water, but the water resource on earth is scarce. Climate change and the growth of population are exacerbating the shortage of fresh water. It is estimated that half of the world's population will live in water-stressed conditions by 2030. The key for water management is to protect water sources and use them appropriately. In addition, the technologies on drinking water safety, rain collection, sewage recycling, water efficiency and seawater desalinization are important tools to adapt to climate change and ease water crisis.

Technology for the reuse of rainwater and floodwater

81. Rainwater collection, storage and utilization technology

Technology Overview

Functions and use: With growing population, deteriorating water shortage and increasingly limited cross-basin water transfer and groundwater development, rainwater collection, storage and utilization technology is again starting to play a unique role. Using modern construction technologies and materials to innovate and reconstruct traditional rainwater harvesting and storage facilities and opening up wider application fields for supplementary agricultural irrigation and ecological reconstruction has an important role to play in solving the problem of drinking water supply and supplementary agricultural irrigation in semi-arid and arid mountainous regions. The China Rural Rainwater Utilization Project won the First Prize in the World Water Action Competition at the 2003 World Water Forum, topping over 700 competing projects from around the globe.

Scope of application: The rainwater utilization technology can be used in the fields of water storage and supply for humans and livestock, agricultural irrigation, groundwater replenishment, ecological maintenance and urban rainwater management. This technology is suitable for all countries and regions with a rainfall of over 250mm. For arid regions such as North Africa and the Middle East where rainfall is less than 250mm, a supporting rain harvest technology, i.e. ″runoff agriculture″ is recommended.

Technological features: Rainwater collection, storage and utilization works are characterized by small investment, fast returns and convenient participation and management by rural households. The technology is an environmentally friendly and resources-saving technology and an effective means for water scare regions to achieve sustainable development and address climate change. The integrated use of rainwater utilization technology and such technologies as water-saving irrigation and ground film-based moisture preservation offers a technical guarantee for arid and water-scare regions to develop agriculture, optimize plantation structure, improve land productivity and reduce poverty.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; has developed mature products; ready for use after simple training, inexpensive to use, and easy to maintain. The technology is now used in 700 counties in 25 provinces in China. Over 12 million water storage pits have been built, meeting the domestic water needs of 36 million people and the supplementary irrigation needs of 40 million mu of farmland. The technology provider has offered training to over 250 technical personnel from more than 70 countries and rainwater utilization pilot bases in Nigeria, Algeria and other countries. Saudi Arabia and the Caribbean region are currently promoting and using this technology. With support from the Ministry of Science and Technology, the technology provider is cooperating with the United Nations Environment Program to provide training and technical guidance to Africa.

Technology Provider

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Technology for the reuse of rainwater and floodwater

82. Water-deficient aquifer exploitation and integrated rain and flood water utilization technology

Technology Overview

Functions and use: In some regions which lack clean and safe drinking water or many regions where fine-grained rocks are distributed, shallow groundwater is often the most effective means to provide local drinking water. However, due to the low water output of a single well, it can hardly meet local needs. This technology mainly adopts a siphon cluster well form to double well water output. To a certain extent, it can meet pump extraction needs and solve the problem of water supply. In addition, it can take full advantage of the conditions of the local terrain and gather rain and flood water to replenish groundwater, purify water quality and enhance sustainable water supply capacities.

Technical information: can double single well water output, and meet the water supply needs of a certain scale.

Scope of application: Suitable for use in plain regions with certain rainfall and runoff-generating areas and shallow areas of fine sand. Regions with seasonal rivers make an ideal application for this technology. Applicable to dispersed water supply in vast rural and pastoral regions and some cities.

Technological features: Low well construction cost, small land occupancy, and can provide water supply in water-scarce regions. Meanwhile, it offers the advantages of improving land and greatly enhancing the potential for development of resources and the environment.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use after special training; low user cost; and users can perform their own maintenance .

Technology Provider

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Safe drinking water technology

83. Drinking water and waste water treatment agent (poly-aluminum chloride，Poly Ferric Sulfate)

Technology Overview

Functions and use: Poly aluminum chloride (PAC) is an efficient coagulant of inorganic polymer containing different amounts of hydroxyl. It outperforms $Al_2(SO_4)_3$ in various aspects, such as small dosage and high adaptability to raw water temperature and PH value changes. It has been widely used in water and sewage treatment. Its main raw materials include aluminum ore, aluminum hydroxide and hydrochloric acid. Made through a unique process route and production system, PAC can meet the growing needs of drinking water and sewage treatment.

Poly ferric sulfate is a kind of macromolecule flocculant with increasing applications in the past 2 decades. In recent years, with the technology of wastewater recycle widely-used, PFS shows its advantage in the advanced treatment of wastewater. It has the features of innocuity, wide PH range applicability, big flocs，fast settlement, effective removal of COD, turbidity and heavy metal ion; low price and dosage. With unique effect in the treatment of low temperature and low turbidity water, it is widely used in the treatment of industrial and municipal sewage.

Technical information: (1) PAC: aluminum chloride >10%(liquid product) or; >29%(solid product); basicity: 45-90%; and insoluble matter content: <1%. (2)PFS: total iron≥11%; reductive matter≤0.10%; basicity: 9-14%; water-insoluble matter:<0.3%

Scope of application: Drinking water and sewage treatment

Technological features: The production technology is simple but highly efficient. It is a technology unique to China.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use, and easy to maintain.

The technology has been used in Iran and Malaysia to replace the conventional water treatment agent aluminum sulfate in the treatment of drinking water, industrial water and oilfield wastewater.

Technology Provider

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84. High-efficiency arsenic and fluorine removal technology using diverse composite oxide

Technology Overview

Functions and uses: can be a cost-effective solution to arsenic, fluorine pollution of the drinking water of rural, town and urban water plant s(stations), solve the problem of arsenic pollution of large water bodies (such as lakes, rivers, reservoirs, etc in a rapid and cost-effective manner to ensure the safety of quality of drinking water of the residents.

Technical indicators: For rural, urban drinking water projects, the project estimates are as follows (excluding water intake and pipeline transmission and distribution works, civil engineering costs): (1) arsenic removal: ： i. Size: 400 m3 / d (rural water plant), equipment Investment: 280,000 Yuan, operating expenses: 0.04 Yuan / ton; ii. Fluoride removal. Size: 5000 m3 / d (town water plant), equipment investment 1.8 million, operating expenses: 0.05 Yuan / ton; iii. Size: 100,000 m3 / d (urban water plant), project investment: 15 million, operating expenses: 0. 03 Yuan / ton. (2) Fluorine removal: i. Size: 250 m3 / d (rural water plant), equipment investment: 300,000Yuan, operating expenses: 0.5/t; ii.Size: 1000 m3 / d (town water plant), equipment Investment: 2 million, operating expenses: 0. 4 Yuan / ton; the service life of the main equipment is 15 years; the operating cost is the chemical cost, excluding electricity, staff costs, equipment depreciation and other expenses.

Application scope: safe drinking water projects in rural areas (arsenic/fluorine removal), arsenic/fluorine removal projects of town water plants, and projects of repair of arsenic pollution of water bodies.

Features: This technology can be used for new water plant (station) construction, but also for existing plant (station) to strengthen the renovation of arsenic (fluorine) removal projects, the investment/operation cost is low, the regeneration cycle may be 2～5 times that of the existing technology. This technology can not only remove arsenic and fluorine effectively in a cost-effective manner, but also remove such pollutants as iron and manganese in the water.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; low use cost, and users can carry out their own maintenance.

Technology Provider

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Safe drinking water technology

85. Mobile drinking water treatment system

Technology Overview

unctions and uses: the mobile drinking water treatment system is composed of the container and transport tool.

Inside the container is the whole set of drinking water treatment system with the UV disinfection technology and membrane technology at the core which can transport provide the customers with drinking water or purified water that meets the hygiene standards at the freshwater and seawater sources accessible to the transport tools.

Technical indicators: (1) water production: 50-250 tons / day (tap water), 5 - 25 tons / day (purified water) (2) self-owned 3-phase diesel generating sets. (3) water quality after treatment: meet the national domestic drinking water standards

Application scope: can be used in a variety of camping operations, field operations, disaster relief and provide a variety of emergency water supplies in case of emergency.

Features: the performance of the mobile drinking water support system reaches the advanced level of similar products in China and it offers such advantages as rapid transport and delivery to the water supply points, wide range of applicable water quality, high treatment efficiency, easy operation and management, safety and reliability.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; high initial input cost but low subsequent use cost; users can carry out their own maintenance.

Technology Provider

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86. Rapid shaft forming device in soft soil layers

Technology Overview

Functions and uses: quick, one-time completion of shaft forming work in soft soil layers 6m below the burial depth of the underground water level

Technical indicators: two operators may finish the 6m shaft forming work within 30 minutes.

Application scope: soft soil layer areas that abound in underground water resources

In comparison with existing drilling and manual excavation, this technology avoids the cumbersome steps to form the shaft, produces savings on the labor and material input, may increase the work efficiency significantly, and may prevent shaft collapse. Using Multi-section drill rig that serves as the shaft wall after the shaft is formed, the drill rig need not be taken out but remains as the shaft wall; after the hole is formed, the filter cartridge is lowered through the hollow drill rig to be clamped to the bottom of the bit to extract underground water directly; the extraction of underground water will not be affected by the increase in the depth and wall deformation due to increase in pressure. The porosity above the filter cartridge is reasonable, which ensures successful extraction of underground water. The setup of the settlement chamber at the lower end of the filter cartridge allows storage of deposits to prevent clogging of the filter holes.

Status of application

Has been promoted and applied; no training is needed; low use cost, and users can carry out their own maintenance.

Technology Provider

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Sewage Treatment and Reuse Technology

87. Integrated technology and equipment for domestic sewage treatment

Technology overview

Functions and use: This equipment Introduces modern film separation technology into sewage treatment, combines fill cell and traditional biological treatment technology to replace the dual sink basin in traditional sewage treatment, and directly puts hollow fibrous films into the biological basin. Uses ultrafilter or microfilter to separate the biomass in the bioreactor and maintain the high biomass concentrator in the reactor, intercepts big molecular solutes and fully degrades the organic matter in water.

Technical information: Processing capacity: 2.5 -50,000m^3/d. In accordance with user requirements, the domestic sewage treated by the MBR system can reach the Grade I level of China´ s Integrated wastewater discharge standard (GB8978-1996) and the water quality level specified in China´ s Reuse of Urban Recycling Water--Water quality standard for urban miscellaneous water consumption (GB/T18920-2002) and Reuse of Urban Recycling Water--Water quality standard for scenic environment (GB/T18921-2002).

Scope of application: Upgrade of existing urban sewage treatment plants; treatment and reuse of domestic sewage from hotels, restaurants and living quarters; reuse of domestic sewage from industrial and mining enterprises, remote rural regions, outposts and scenic spots. Various kinds of industrial waste of a similar nature to that of domestic sewage (such as hospital waste water, pharmaceutical waste water, washing waste water, food waste water, cigarette waste water and so on).

Technological features: 1. Good output water quality, and various indicators better than those specified in China´ s Water quality standard for miscellaneous domestic water consumption, and no apparent difference from tap water; 2. possess the denitrification function and there is no problem of eutrophication in the output water; 3. compact structure, takes up minimal space, flexible layout, and can be above or under ground; 4. less remaining sludge; and reduces sludge disposal expenses; 5. fully automatic PLC control, and convenient management; 6. adopts converter technology, low operating cost; 7. has self-maintenance and cleaning functions and a long service life; and 8. modular design and easy to expand.

Status of application

Has been promoted and applied; ready for use after simple training; low cost of use; and users can carry out their own maintenance.

Technology Provider

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Sewage Treatment and Reuse Technology

88. Rural domestic sewage treatment equipment and technology

Technology overview

Functions and use: The main function of this technology is to comprehensively treat rural domestic sewage and bring it up to the specified discharge standard, thus improving the rural living environment and helping the building of new countryside. It includes the following three main processes: (1) sewage treatment through a ″solar aeration contact oxidation plus land filtration basin system″ . The first part adopts biological contact oxidation technology and can reduce the pollution load by over 50%, while the land filtration basin in the latter part can double its hydraulic load. This can reduce the existing land filtration basin area by half, thus saving agricultural land; (2) anaerobic and aerobic (solar aeration contact oxidation). The whole system forms an anaerobic and aerobic combination and effectively removes COD, BOD, total nitrogen and total phosphor; (3) high load anaerobic biological filtration basin. The system consists of several PE basins and is suitable for use by 4~8 households.

Technical information: The technology reaches the national discharge standard of Level 1B, with COD ≤60 mg/l; ammonia ≤8 mg/l; total nitrogen ≤20 mg/l; and total phosphor ≤1 mg/l.

Scope of application: Rural regions with scattered settlements, instability and lack of sewage pipe systems.

Technological features: (1) The technology uses solar aeration to solve the problem of oxygen supply for biological contact oxidation treatment, avoids the use of civilian electricity and lowers operating cost; (2) The technology combines biological contact oxidation with land filtering and can save land resources by over 50% over land filtration technology under the same output water quality; (3) A large number of modular systems are used as a treatment structure, which helps standardized construction, operations and management; (4) The new technology is particularly applicable to rural regions with a shortage of land resources, scattered household settlements and low terrain.

Status of application

The technology can be put into commercial production in developing countries; simple training is needed; low use cost; and users can perform their own maintenance.

Technology Provider

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Sewage Treatment and Reuse Technology

89. EWS high-efficiency wastewater treatment machine series equipment

Technology overview

Functions and uses: used for the treatment of domestic wastewater. The EWS high efficiency wastewater treatment equipment has also won the national key new product certificate awarded by the 4 ministries/ commissions including the Ministry of Environmental Protection and Ministry of Commerce.

Technical indicators: the EWS-1 / 2 high-efficiency wastewater treatment machine: this product consists of the biological treatment unit, solid-liquid separation unit, disinfection unit and automatic control unit, the outlet water can reach the Class 2 and above criteria in the integrated discharge standards (GB8978-1996). For less than 80 tons per day wastewater treatment, the power consumption is only 1/2-1/4 of that of similar equipment, and the operating costs decreases by about 1 / 3. As a high-efficiency wastewater treatment machine, the EWS-3 is mainly is mainly used for direct disinfection of wastewater discharged by small hospitals, small clinics, epidemic prevention stations and other units whose daily wastewater volume is about 50t, the treated wastewater meets the Class III criteria in the integrated discharge standards（GB8978-1996）, and the disinfection indicator meets the SARS-proof requirements. The operating power of the equipment is less than 30W, only 1/20 of the chlorine dioxide generator and the operating cost is reduced by about 1/3.

Application scope: The series equipment is mainly applied to small hospitals, disease prevention and control centers, shopping malls, schools, nursing homes, hotels and residential quarters and other areas where the wastewater treatment volume is small.

Features: the EWS high-efficiency wastewater treatment machine is a new type of high-efficiency, energy-saving wastewater treatment equipment, which may be adjusted according to different water quality, water quantity, discharge requirements of the equipment. Adopting the metal building

block structure, the equipment features a small footprint, offers greater flexibility than civil construction, is easy to install and use. The whole set of equipment adopts automatic control, low-power consumption design, can run automatically according to the water volume and shut down automatically when there is no wastewater.

Status of application

Has been promoted and applied; mature product; simple training is needed. low use cost, and users can carry out their own maintenance.

Technology Provider

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90. Removal of nitrogen and phosphorus from urban wastewater by the composite artificial wetland method

Technology overview

Functions and uses: the horizontal flow artificial wetland and the vertical flow artificial wetland are connected in series to form the composite artificial wetland , the wastewater first passes through the horizontal flow artificial wetland to have most of the SS, COD, BOD5 and some ammonia removed; then, the continuous operation mode is adopted to distribute water to the vertical flow artificial wetland for thorough removal of the oxygen consuming organic matters and the remaining ammonia, and return the water from nitration of the vertical flow artificial wetland according to back flow ratio of 50%-100% to the horizontal flow artificial wetland for an-nitration nitrogen removal treatment.

Application scope: wastewater treatment

Features: the horizontal flow artificial wetland abounds in calcium-rich dolomite and marble or limestone while the vertical flow artificial wetland abounds in iron, calcium, silicon and aluminum oxide-rich furnace slag or artificial substrate prepared by mixing them with grass carbon and soil. The aquatic plants planted on the horizontal flow artificial wetland are umbrella palm and softstem bulrush while the terrestrial plants planted on the vertical flow artificial wetland are Canna lily and Cyperus malaccensis.

Technology Provider

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Status of application

Has been promoted and applied; can be put into industrial production in developing countries; simple training is needed; high initial input cost but low subsequent use cost; users can carry out their own maintenance.

Sewage Treatment and Reuse Technology

91. Low-energy consumption membrane bioreactor (MBR)

Technology overview

Functions and uses: MBR is used for wastewater treatment.

Technical indicators: new technologies such as gas impulse and mechanical cleaning are integrated into the membrane unit; a variety of techniques controlling the filterability of the mixed liquor enable the extension of the membrane operation cycle by 2-4 folds; online chemical cleaning modes are suitable for membrane units with different sizes and degrees of automation; the development of a variety of combined processes contributes to the reclamation of water resource from wastewater.

Application scope: the characteristics of the MBR enable it to exhibit enormous potential in the treatment and reuse of a wide variety of wastewater. It is possible to develop new combined processes such as: enhanced nutrient removal A2/O-MBR processes corresponding to influents with different C/N ratios, anaerobic hydrolysis/acidification-MBR processes and MBR-RO processes.

Features: Development of the novel and energy-efficient technology, MBR, for wastewater treatment and reclamation. The project carries out systematic research, with innovative achievements, on: membrane unit configuration, membrane fouling control technology, new combined processes and large-scale engineering applications.

Technology Provider

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Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; high initial input cost but low subsequent use cost; users can carry out their own maintenance.

92. Centralized treatment of rural domestic waste

Technology overview

Functions and use: Sorting and recycling waste from domestic garbage, the technology can degrade waste and turn it into harmless and effective composting.

Technical information: (1) For a daily treatment volume of 15t, cost: RMB225 Yuan/d; (2) environmental benefit; harmless waste treatment ratio: 100%; resource recycling; composting: 3 t/d; pollution emission reductions; COD: 120kg/d; NH_4^+-N: 4kg/d; and (3) social benefits; landfill reduction: 8 t/d. Saves 600m^2 of land annually; no stench generated at landfill sites; and environmental improvement for nearby residents.

Scope of application: Mixed domestic waste collected from rural town settlements and surrounding settlements; sorted waste (organic waste) collected from marketplaces, the catering industry and canteens (organic waste); and plant processing waste.

Technological features: Adopts windrow composting as the main technology and directly composts collected mixed domestic wastes after bag breaking and screening. Recyclable resources, thorough harmless treatment and low cost.

Status of application

The technology has been promoted and applied; can be put into commercial production in developing countries; simple training is needed; low use cost; and users can perform their own maintenance.

Technology Provider

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Seawater desalination

93. Seawater or brackish water desalination film technology

Technology overview

Functions and use: Uses NF and RO film technology to desalinize seawater or brackish water.

Technical information: Desalination ratio: 99%; recovery ratio: 10-40%.

Scope of application: The mobile device is applicable to supplying water to organizations which carry out on-board or ship-use mobile operations, such as ocean merchant ships, drilling platforms and field explorations. The industrial-scale seawater desalination installation is suitable for islands, residential sites, high-salinity regions and seawater intrusion regions.

Technological features: Adopts NF for pretreatment, i.e. the NF-RO system. NF removes part of the salinity and TDS, thus improving RO´s water recovery efficiency. It can reduce energy consumption by 25% and water making cost by 30%.

Status of application

Has been promoted and applied; ready for use after simple training; low cost of use; and users can carry out their own maintenance.

Technology Provider

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94. RO and distillation seawater desalination device

Technology overview

Functions and uses: seawater desalination means production of freshwater through seawater desalination to provide domestic water such as drinking water and washing water that conform to the WTO domestic water hygiene standards. It can address the needs of regional water supply of domestic water and industrial waster of ships, rig platforms, islands and coastal cities. The device mainly consists of the RO and distillation seawater desalination devices.

Technical indicators: 1. Reverse osmosis desalination plant: seawater salinity ≤ 50000mg / l; freshwater Yield: 1-1000m3 / d; total dissolved solids (TDS) in freshwater ≤ 700mg / l; total power of unit: 1.1-160kW. 2 distillation seawater desalination unit: seawater salinity ≤ 36000mg / l; distilled water yield: 1-1000m3 / d; total dissolved solids (TDS) in distilled water ≤ 5mg / l; gained output ratio ≥ 2. 4; total power of the unit: 1. 5-250kW.

Application scope can be widely used on various types of ships, drilling platforms, islands, coastal cities, etc., to provide the crew and residents with domestic water.

Features: System, complete system, compact structure, low noise, modular structure, high reliability. a) High degree of automation and ability to adjusting the operating conditions automatically according to seawater temperature and salinity changes. b) Modular structure, allowing for easy installation, maintenance and operations management. c) extensive application to meet the requirements of the ocean-going vessels for the freedom from restrictions on navigation zones and able to convert seawater with a salt content up to 50000mg / l into freshwater that meets the drinking water hygiene standards through desalination d) low energy consumption of the unit, a minimum of 3.83.8kWh per ton of water.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; simple training is needed; low use cost, and users can carry out their own maintenance.

Technology Provider

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Water conservancy project

95. Rubber dam technology

Technology overview

Functions and use: Rubber dams can rise to block water or fall to let water flow. Dam height can be freely adjusted, while overflow depth is controllable. Such dams can play the role of sluices, overflow dams and active dams. They have the same operating conditions as a sluice and are used in flow control, irrigation, power generation, water supply, shipping, tide buffering, groundwater refill and urban gardening and beautification.

Technical information: Dam height is usually less than 5m, while dam length is in line with the width of the local river. Dam bags usually have a service life of 20 years. After replacement, dam bags can continue to be used.

Scope of application: Rubber dams are suitable for farmland irrigation, small hydropower, urban gardening and beautification, urban and rural water supply, costal tide gates and wave dams, shipping locks, construction embankments or active dykes, and other low hydraulic head, wide span sluice and dam projects.

Technological features: Low construction cost; wide span and no water blockage after dam collapse; anti-seismic performance; good water stop effect; simple structure, and short construction cycle; and flexible operations and low maintenance cost.

Status of application

The technology can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use, and users can carry out their own maintenance.

The technology provider has designed and built over 20 rubber dams for Bangladesh, 6 for Thailand, 1 for Indonesia, 3 for Viet Nam, 2 for Iran, 6 for South Korea and 1 for Italy.

Technology Provider

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South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

For developing countries undergoing industrialization and urbanization, it is important to think about ways for rational use of resources, protecting the environment, avoiding unsystematic development and preventing ecological damage. Technologies for resource utilization, environmental protection and remote sensing are important tools to realize the above goals and achieve sustainable economic growth in developing countries.

Resources and environment technologies

Environmental monitoring

96. Water environment monitoring technology

Technology overview

Functions and use: Comprehensive planning for water environment monitoring systems of lakes; Consultation and training of field and laboratory water monitoring technologies; Through dynamic monitoring of water environmental quality and analysis of its trend of changes and the influencing factors, it can provide information for the decision making facilitating both regional development and environment protection.

Scope of application: can be used in long term water environment monitoring and comprehensive survey of lakes, environmental impact assessment of regional development, and water environment monitoring of other water areas.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training; high initial input cost but low subsequent use cost; and users can perform their own maintenance.

The technologies have been applied in the water environment monitoring and ecological protection of Lake Tanganyika in Africa.

Technology Provider

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97. Grassland conservation and restoration technology

Technology overview

Functions and use: (1) Introduction and domestication of wild grass and forage crop varieties; (2) establishment of dryland artificial grasslands mainly of Xerophytic grass; (3) grassland animal husbandry development technology, which can improve forage production and the ecological environment, promote large-scale production of fine forage varieties and enrich ecological grass resources.

Technical information: (1) Fodder corn yield in regions with few hours of sunshine in Mongolia has reached 7500kg/h·m^2 and an average fresh forage yield of 6000 kg/h·m^2; (2) applies comprehensive technologies to improve degraded grassland, increasing vegetation cover rate by 10-15% and yield by 20-30% and bringing superior quality forage ratio to >60%.

Scope of application: Semi-arid and arid regions; natural grasslands and mountainous areas; and degraded grasslands.

Technological features: Improves the ecological environment; establishes dryland artificial grasslands mainly of Xerophytic grass; and zero tillage and supplementary sowing on degraded grasslands.

Status of application

The technology has been promoted and applied; can be put into commercial production in developing countries; ready for use after simple training; low user cost; and users can perform their own maintenance.

Cooperation agreement has been reached with Mongolia to provide zero tillage supplementary planters and set up local grassland animal husbandry research and experimental bases.

Technology Provider

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Resource

98. Non-metallic minerals (industrial minerals) mining, dressing and deep processing technology and complete equipment

Technology overview

Functions and use: The technology and equipment can be used in the development and utilization of various non-metallic mineral (industrial minerals) resources (Kaolin, graphite, feldspar, silica sand, bentonite and so on) and produce high-performance non-metallic mineral products for use in the paper making, coating, ceramics, household chemicals, plastics and rubber industrial fields.

Scope of application: Various non-metallic minerals (industrial minerals) resources, such as Kaolin, graphite, feldspar, silica sand, bentonite and so on).

Technological features: Wide applicability, high practicality, high price/performance ratio, and particularly suitable for developing countries. Based on local mineral resources and market demand for products, the technology can provide engineering consultancy, engineering design and construction services.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use; and users can carry out their own maintenance.

The technology has been used in the 100,000t/a Kaolin mining and dressing project at Middle East Mining Corporation, Egypt. The project has now entered the equipment installation and adjustment stage. With highly cost-effective technology and equipment, the project has won recognition from the Egyptian construction side.

Technology Provider

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99. Technology of remote sensing monitoring for the mineral resource development environment

Technology overview

Functions and purposes: Surveying and monitoring of the mineral resources development environment.

Technical specifications: (1) the surveys on the scale of 1:250,000 are conducted to investigate mine environment, mine geologic background and the implementation of the mineral resource plans by remote sensing technology. (2) The surveys on the scale of 1:50,000 are conducted to investigate and monitoring the mineral resource exploitation status, mine environment and implementation of the mineral resource plan. (3) And the surveys on the scale of 1:10,000 are conducted to investigate and monitoring the mineral resource exploitation status and mine environment.

Application scope: survey and monitoring of the mineral resources development status to provide related government departments with supports for decision-making.

Features: Fast, multi-scale environmental survey, monitoring and management of mineral resources development.

Status of application

The product and technologies have been put into surveying, with.training needed. Large initial investment.lead to a low use-cost later. Training of the maintenance personnel or establishing maintenance station is required.

Technology Provider

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Desertification combating and prevention

100. Clay sand barrier setup technology

Technology overview

Functions and use: Sand dune fixation

Scope of application: Regions with sand dune hazards.

Technological features: Low cost, simple setup, and good control effect. The sand barriers are perpendicular to the predominant wind direction. They adopt a parallel row pattern in places where the wind is predominantly from one direction, and a grid or ″品″-shaped pattern in places where there are more side winds. Fishbone-shaped or ″非″-shaped barriers are often adopted in ridge terrains. Sand dunes with complicated shapes are usually protected with fishbone-shaped barriers. Barrier ridge spacing is determined by inter-barrier sand erosion/deposition conditions.

Status of application

Has been promoted and applied; ready for use after simple training; low cost of use; and users can carry out their own maintenance.



Technology Provider

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101. Sandy field plantation technology

Technology overview

Functions and use: Water-saving farming in semi-arid regions.

Technical information: Sandy fields adopt no-till plantation. When crops are harvested from a sandy field, they are completely uprooted, with no residue left. Sandy fields have a long service life. 20-year-old sand fields are called new sandy fields, 20-40-year-old ones are called middle-aged while those 40~60-year-old are called old sandy field. Water sandy fields have a rather short life span, only at 5~6 years.

Scope of application: Semi-arid region rich in sand and pebble resources

Technological features: Water-saving, drought-resistant, high yield and superior quality. Sandy fields should be selected from flat land or sloping land with fertile soil, to be covered with fine sand and pebbles or with a sand/pebble ratio of 70:30~50:50. The land should be leveled and harrowed before sand is spread over. After the soil is leveled and compacted, spread fertilizers on the surface but do not mix it with the soil. Lay sand after fertilizer has been applied. In the winter season, spread sand after the soil has become frozen. The sand layer is usually around 10cm thick. Sowing is spaced according to plant interval. Sand is opened for bunch sowing.

Status of application

Has been promoted and applied; ready for use after simple training; high up-front cost but low cost of use, and users can carry out their own maintenance.

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Desertification combating and prevention

102. Shelterbelt projects in deserts

Technology overview

Functions and use: In accordance with blown sand activities and the type, intensity and engineering characteristics of sand hazards in desert construction areas, to design the structure and layout of a sand control system for different topographic situations including the selection of suitable tree species and their layout as well as accessory sand control configurations. And, based on the rainfall and evaporation intensity, soil type, plant species and irrigation water´ s physical and chemical properties in desert construction areas, to formulate the mode of irrigation, the irrigation water quota and irrigation system for sand shelters.

Technical information: This technology develops and uses high salinity groundwater resources and highly-resistant plant species in deserts to build an integrated engineering and biological sand protection system and can ensure the lasting and safe operation of engineering works.

Scope of application: Arid regions, desert regions and ecological engineering construction regions.

Technological features: The technology can bring engineering sand hazards under long-term effective control and promote the sustainable development of shelter belt systems. It achieves the development and utilization of poor quality water resources, saves freshwater resources and maintains the balanced extraction of ground water resources. The technology can produce notable ecological effects; enhance bioengineering development through engineering protection systems and increase economic returns.

Status of application

Has been promoted and applied; ready for use after simple training; high initial input cost but low long-term cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

The technology provider has promoted and set up successful technologies and examples of desert highway shelter belt bioengineering construction on the desert highway, as well as an operation area and living settlement greening projects on the west banks of Amu Darya in Turkmenistan which have produced good results.

Technology Provider

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103. Desert sand-fixing and plant growth technology

Technology overview

Functions and use: Uses inorganic materials to effectively fix sand for plant growth.
Technical information: Plant survival rate: >80%.
Scope of application: Desert regions.
Technological features: Low sand fixation cost, and mature technology.

Status of application

Can be put into commercial production in developing countries; simple training is needed; low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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Energy-saving technologies for buildings

South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

The building sector is one of the three major sources of global GHG emissions, in particular the production of building materials and the use of buildings. The industry holds enormous potential for emissions reduction over an extended period of time. The R&D and promotion of energy-saving materials and green building technologies are the key to reducing GHG emissions in the sector.

104. Autoclaved (sand lime) brick production line

Technology overview

Functions and use: Wall material products. The products made by this technology and equipment are characterized by low specific weight, high strength, low heat conductivity and fast construction speed. They can be adapted to different levels of automation and investment conditions and requirements.

Scope of application: The technology and equipment can be used in the construction material industry and investors with other investment requirements. With less investment and fast returns, their products can be adapted for different climate conditions and architectural structural requirements.

Technological features: The technology uses fly ash or (quartz) sand, lime and other materials as the raw material and through grinding, stirring, compression and autoclaved maintenance, eventually form wall material products of various specifications, requiring no fuel. This can avoid the environmental impact of smoke generated in the sintering process.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training, inexpensive to use and maintenance personnel need to be trained or a maintenance station needs to be established.

We have signed a Letter of Intent with a South African firm in talks over a general contract for a sand lime brick production line with an annual output of 40 million bricks.

Technology Provider

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105. Expanded and vitrified small ball, heat-insulated and fire-proof mortar

Technology overview

Functions and use: This technology is designed to develop a kind of new inorganic light mortar material. It can be widely used in the masonry, heat insulation, plastering and other architectural sections of buildings. It can not only meet the national and industrial energy conservation requirements of buildings but also achieve fire-proof and convenient construction, cost reduction, integrated resource utilization and other social and economic benefits.

Technical information: Uniformity: ≤5%; stratification: ≤20 mm; dry apparent density: ≤300kg/m^3; thermal conductivity: ≤0.070 W/(m•K); heat storage coefficient: ≥1.5 W/(m^2•K); linear shrinkage: ≤0.3%; (with concrete mortar block) original strength: ≥0.050; tensile strength:≥0.10 MPa; compressive strength:≥0.20 MPa for wall body use and ≥0.30 MPa for floor and roof use; and softening coefficient: ≥0.

Scope of application: The technology and product are mainly used as a heat insulation and fire-resistant material in the building energy conservation field.

Technological features: Production equipment for the completely new inorganic light aggregate--expanded and vitrified small ball; unique production process for expanded and vitrified small ball; production of expanded and vitrified small ball light mortar; and heat-insulated mortar is essentially fire-resistant.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after simple training, low use cost, and users can carry out their own maintenance.

The technology provider has successfully transferred set equipment and technology to Romania, Mongolia and other countries.

Technology Provider

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106. Fired brick production technology and equipment

Technology overview

Functions and use: Excellent new wall material

Technical information: The products include porous bricks and hollow bricks, with a strength class of no lower than Mu15 and a compressive strength of ≥10.0MPa.

Scope of application: The technology and equipment are applicable to building material enterprises or construction enterprises. Their fired products can be used in buildings, squares, roads and other places.

Technological features: The technology and equipment use clay, shale, gangue and fly ash as raw materials and adopt soft plastic, semi-hard plastic and hard plastic extrusion forming technologies. From raw material processing to forming, kiln car stacking and drying & sintering, the set equipment of the production line can fully achieve automatic or manual/semi-automatic operations. It can make products to various specifications, lower work intensity and improve the work environment. Because fly ash or gangue itself contains a certain amount of heat or adopts an internal burning model with added coal ash it can save fuel or coal consumption and offers such notable advantages as safety, durability, energy conservation, environmental friendliness and fire resistance. It is a new wall material of superior quality.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training, inexpensive to use and maintenance personnel need to be trained or a maintenance station needs to be established.

The technology provider has built several clay fired brick factories in Bangladesh, earning around $300,000 in foreign exchange each year. It has also built several fired brick plans in Cambodia and Malaysia. All these enterprises are now performing well.

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107. low-carbon production technology of cement and wall material with cinder

Technology overview

Functions and use: (1) Low-carbon masonry-type cement, which can replace Portland cement in the masonry and surface mortar, concrete cushion and construction fields; (2) weight-bearing bricks and hollow blocks, which replace sintered solid bricks and can be used in civilian buildings and walled low-rise buildings.

Technical information: (1) Masonry cement meets the 12.5 strength grade in GB/T 3183-2003Masonry Cement; (2) load-bearing bricks meet the MU10 grade in JC 239-2001 Fly Ash Brick; and (3) hollow blocks meet the >3.5 grade in GB/T 15229-2002 Light Aggregate Concrete Small Hollow Blocks.

Scope of application: This technology uses volcanic ash as the main raw material to make masonry cement to replace Portland cement for use in the masonry and surface mortar, concrete cushion and other construction fields. After being crushed, porous volcanic rocks can serve as a light aggregate to make, along with cinder-based cementitious material, wall materials like load-bearing bricks and blocs and decorative materials like decorative bricks and stat bricks.

Technological features: As it is formed, volcanic ash goes through a high temperature stage and naturally forms an inorganic material with potential hydraulic reactivity. Compared with conventional silicate cementitious material and resultant wall material technologies, this technology is mainly characterized by reuse of waste, energy conservation and reduction of carbon dioxide emissions in the production process. It is an environment-friendly material. In addition, it has low production cost and good economic benefits.

Status of application

The technology can be put into industrial production in developing countries; special training is required before use; and inexpensive to use.

The technology provider has reached a cooperation agreement with an Ethiopian company. The two sides have set up a joint venture to produce green construction materials (standard bricks and blocks).

Technology Provider

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108. Manufacturing of porous or hollow bricks through sintering of shales

Technology overview

Functions and uses: to make porous or hollow bricks through the sintering of shales to reduce loss of clay, enhance wall insulation, reduce the energy consumption of production, achieve the objective of energy conservation & emission reduction, and building energy conservation, and replace the clay bricks as the new wall materials.
Technical indicators: porosity greater than 26%, strength greater than 5MPa, heat loss less than 950 kcal / ten thousand standard bricks.
Applicable scope: wall materials
Features: easiness of sintering, high strength, small investment and use of inferior resources

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is needed; low use cost, and users can carry out their own maintenance.

Technology Provider

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109. Complete technology and application of multi-ribbed slab struture energy-saving housing

Technology overview

Functions and uses: the multi-ribbed slab structure is an eco-friendly, energy-saving insulation, energy dissipation, rapidly built, economical and practical new system of residential structure.

Technical indicators: 1) eco-wall materials that may be manufactured according to local conditions, are energy saving and environmental friendly. For construction of 10,000 square meters of housing, 2600-3000 cubic meters of industrial and agricultural waste will be consumed, and destroying of 800 to 1000 square meters of farmland for excavation of clay to make bricks can be avoided ; 2) under the same average thermal resistance of the wall body, the thickness of the multi-ribbed wall is 1/3 that of the clay brick wall and 60-90t of standard coal may be saved per year per 10000 square meters of housing; 3) the self-weight decreases by 35%, 30%, 33% in comparison with the brick, frame, shear wall structure; 4) the loading property of the structure lies between1.6-1.8 folds, and the deformation capacity increases by more than 2 folds in comparison with the brick structure; 5) compared to the traditional construction technology of the residential structure, the construction period is shortened by 1/4-1/3 and the volume of construction wastes on the site decreases by more than 2/3; 6) the construction cost of the multi-ribbed slab structure decreases by more than 4-6%, 10-12% and 15% than the brick, frame and shear walls.

Application scope: applicable to multi-storey and medium-to-high residential buildings.

Features: the structure is filled with eco-friendly materials that can are obtained locally and processed according to local conditions, energy-saving and environment friendly and replace the traditional clay bricks, enabling rapid construction and industrialization of the residential structure.

Status of application

Has been promoted and applied; special training is needed; the use cost is low and it is maintenance-free.

Technology Provider

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South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

Energy conservation and emissions reducing technologies for industrial production

The secondary industry is the pillar of national economy, and has contributed 80% of global CO_2 emissions (developed countries in particular) over the past 200 years. It has led to environmental pollution and aggravated climate change. To foster a modern and green industry, it is necessary to develop environment-friendly, energy-saving and emissions reduction technologies. The R&D and application of green technologies in manufacturing, chemical and other industrial sectors will effectively reduce GHG emissions, and promote sustainable industrial development and economic growth.

Enhancing energy efficiency

110. Large float glass production line

Technology overview

Functions and use: This technology is mainly used on 500-1,200ton-level large float glass production lines. It reduces energy consumption in glass production, accurately controls process parameters for big tonnage glass production lines and stabilizes glass quality.

Technical information: Lowers glass furnace heat consumption to 300-1,500kcal/kg glass liquid.

Scope of application: Building glass, automobile glass and mirror-making glass.

Technological features: With stable glass quality and effective energy consumption in glass production, the technology has reached the internationally advanced level.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; special training is required before use; inexpensive to use and maintenance personnel need to be trained or a maintenance station needs to be established.

The Indonesian project was put into operation in March 2007. It has been in normal operation for 3 years, reaching the design requirements. The project has generated good economic benefits for users and won high praises from the owner.

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111. High-efficiency, energy-saving and low NOx emission lime kiln

Technology overview

Functions and use: Used for the sintering of lime, dolomite, magnesite, bauxite and other bulk materials.

Technical information: Heat consumption is <4180kj/kg-lime.

Scope of application: Applicable to the sintering of lime, dolomite, magnesite, bauxite and other bulk materials.

Technological features: With simple structure and easy operation, the technology saves investment by 40~60% and heat consumption by 10~25%.

Status of application

The technology can be put into industrial production in developing countries; ready for use after simple training, inexpensive to use, and users can carry out their own maintenance.

A 100tpd lime production line EPC in Kazakhstan; and a 100tpd lime production line EPC in Kyrgyzstan.

Technology Provider

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Enhancing energy efficiency

112. High voltage and high power frequency converter (HVC)

Technology overview

Functions and use: A high-voltage, energy-saving motor inverter series which is made by adopting the state-of-the-art IGBT power cell series multilevel technology, digital control technology, SPWM technology, superconducting heat pipe cooling technology, voltage multiple cell series technology and vector control technology. HVC offers such features as high efficiency, energy saving, high power factor, high reliability and four-quadrant operation. It can automatically set frequency and operation mode, control mode, automatically display and record operational data, aside from the sound protection functions. It can achieve 30~70% energy conservation and consumption reduction.

Technical information: Rated input voltage/permissible change range: ≤10kV±15; system′s input voltage: 3kV, 6kV and 10kV; inverter′s output voltage/change range: 0-10kV; inverter′s rated output current range: ≤6000A; input power factor: >96; inverter efficiency: 98%; rated input frequency/ permissible change range: 50Hz±5; output frequency range: 0-50Hz; and rated power: ≤72MW.

Scope of application: The product is suitable for blower fans, water pumps and other one-quadrant operation loads as well as for hoists, rolling mills, paper machines, rolling stock traction and other four-quadrant operation loads in the thermal power, petrochemical, coal mining, metallurgical, water supply and sewage treatment industries. It can regulate high voltage motor runs and optimize their control and save energy consumption by 30-70% of energy, thus playing the role of a large-scale energy conservation and consumption reducer.

Technological features: The technology achieves ″perfect non-harmonic″ output for motors and "zero harmonic" input for grids; adopts a high voltage, changeable current chain modular design and through combinations, can easily change 18MVA, 36MVA, 54MVA and 72MVA to ultra high voltage inverter system of higher power classes; adopt high-voltage water cooling technology; can drive both asynchronous motors and synchronous motors; and, can be used as both the soft start and the continuous speed regulation of ultra power motors.

Status of application

The technology has been promoted and applied; ready for use after simple training; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

The technology and product have been widely used in European countries, such as Germany and Italy; Asian countries such as India, Turkey, Viet Nam, Thailand and Myanmar; African countries such as Nigeria and Sudan, and South American countries such as Brazil.

Technology Provider

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113. Static Var Compensator (SVC)

Technology overview

Functions and use: A kind of high voltage dynamic var compensator which is based on high-reliability thyristor (electromagnetic trigger, photoelectric trigger or optical trigger) converter technology, and compensates system var, with a maximum compensation capacity of ±300MVar. The device can improve the power factor, reduce line loss, raise grid transmission power, filter out harmonic, remove negative sequence, effectively solve the problem of subsynchronous resonance, inhibit voltage fluctuations and flicker, balance three-phase grids and save electricity by an average of over 30%. SVC possesses reactive power, voltage, current and various regulatory functions. With simple structure, it can achieve self-cooling, maintenance-free operation, real time and remote monitoring.

Technical information: Grid voltage: ≤66kV; TCR´ s rated power: ≤300Mvar; thyristor type: electricity-triggered thyristor (ETT) or light-triggered thyristor (LTT); triggering mode: photoelectric triggering or light triggering; control system: DSP total digital control system; control mode: reactive power or voltage; var regulation range: -100-+100; regulation model phase-specific regulation; regulatory system´ s response time: <10ms; noise level: cold without noise; and, accessory grid´ s power supply voltage: 80V+15.

Scope of application: The product can be widely used in the modern metallurgical, power, electric rail track and coal mining industries.

Technological features: Corrects the power factor of dynamic var load; improves voltage regulation efficiency; raises power systems´ static and dynamic stability and dampens power oscillation; lowers overvoltage; reduces voltage flicker; inhibits subsynchronous resonance; reduces voltage and current imbalance; and inhibits negative sequence current.

Status of application

The technology has been promoted and applied; ready for use after simple training; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

The SVC technology and product have been widely used in countries such as Viet Nam, Thailand, Myanmar, Turkey, Nigeria, Sudan and Brazil. The technology provider has also provided SVC subcontracting services to the Italian company Danieli and other international engineering contractors. For 5 consecutive years from 2005 to 2009, it has installed the largest number of SVCs, more than ABB and Siemens. The company now has over 840 SVCs in operation.

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Enhancing energy efficiency

114. New dense-phase, high-density fluidized bed dry method separator and indeterminate large vibrating screen

Technology overview

Functions and use: Solves key scientific problems of coal separation and purification technologies in cold, arid and water-scare regions, and achieves high-efficiency dry method coal separation and in-depth wet particulate material screening.

Technical information: Processing volume: 50t/h; Ep value: 0.05-0.07; separation efficiency: >95%; and media loss: < 0.5kg/t of coal, reaching an internationally advanced level. The indeterminate large vibrating screen has a width of over 3m and vibration amplitude of around 9mm and achieves a screening efficiency of over 85%.

Scope of application: The dense-phase, high-density fluidized bed separator can be used for separating and processing coal in cold and arid regions. The indeterminate large vibrating screen has a large surface area and high screening efficiency and can be used in medium-sized and large coal separation plants.

Technological features: Fluidized bed dry method coal separation technology offers advantages such as: no use of water, zero pollution, low investment and operating costs. It is especially suitable for coal separation in cold and arid regions. The indeterminate large vibrating screen fully adopts an indeterminate beam structure combination and solves the problem of the reliability of large vibrating screens.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; ready for use without training; inexpensive to use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

A 10t coal sample selectivity test and a new dense-phase, high-density fluidized bed semi-industrial separation test have been conducted in South Africa, respectively achieving a clean coal and gangue output ratio of 87.45% and 12.55% and an ash output ratio of为12.40% and 88.84%. Clean coal output rate is high, and output gangue is of high purity. A cooperation agreement has been signed with a company in South Africa to transfer this technology.

Technology Provider

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115. Near zero emission dimethyl ether production technology

Technology overview

Functions and use: This new technology for producing alternative energy ″dimethyl ether″ , encompassing the near zero emission dimethyl ether production process, a new highly active catalyst with high selectivity, a new reactor with an environment-friendly, energy-saving system, produces new zero emission dimethyl ether. The technology has been successfully put into production.

Technical information: Methanol consumption (t/t): 1.40; power consumption (KWH.t): 16.5; water consumption (t/t): 0.1; steam consumption (t/t): 0.70; process water´ s COD value (mg/L): 9~20 (total wastewater recycling and use); and exhaust emission (Nm^3/h): 2.5 (total recovery).

Scope of application: Use of this technology is not dependent on geographic or climatic conditions.

Technological features: (1) Energy conservation efficiency: > 40%; (2) new dimethyl ether catalyst selectivity: >99.85%, and one-way conversion rate: >80%; (3) low temperature at the entrance of the new dimethyl ether reactor, even bed temperature distribution, few side reactions and large processing volume; and (4) dimethyl ether sewage treatment process and high-efficiency reactor processing unit technology have been developed.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; mature product; ready for use after special training, inexpensive to use, and users can carry out their own maintenance.

This technology has been used in 3 dimethyl ether production installations in China, with an annual production capacity of 210,000 tons, 200,000 tons and 100,000 tons. It has also been successfully applied and used in a 200,000t/a dimethyl ether project in Egypt.

Technology Provider

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Improved and alternative production technology

116. Rolling Press Series

Technology overview

Functions and use: Rolling Press adopts the principle of high pressure material layer smashing. It squeezes materials which enter the squeeze zone and thus smashes materials and improves their grindability. Rolling presses are widely used in the breaking up of brittle materials in the cement, chemical, metallurgical, mining and other industries

Technical information: (1) Rolling Press Series have a production capacity of over 170t/h (42.5# ordinary Portland cement) per set, and can fully meet the needs of 5000t/d and higher large-scale new dry method cement production lines and 1 million t/a single production line cement powder grinding stations; (2) Roll wear-resistant surfacing layer´ s service life: ≥8,000h, allowing automatic, on-site, roll surface repair of the roll surface; (3) The powder grinding system of the rolling press has a unit power consumption (42.5# ordinary Portland cement, specific surface area: 340 ± 10m^2/kg, including ball mill) of ≤28kWh/t, which is more than 10kWh/t less than that of traditional ball mill systems. System operation rate reaches 90%; and, (4) The rolling press control system has an MTBF of 50,000h.

Scope of application: The product series have been widely used in the preparation of raw materials and cement for new dry method cement production lines as well as the smashing of brittle materials in the mechanical, metallurgical and mining industries.

Technological features: Effectively improves the grindability of materials, and has wide applications.

Status of application

The technology has been promoted and applied; special training is required before use; high initial input cost but low subsequent use cost and maintenance personnel need to be trained or a maintenance station needs to be established.

It has been promoted and applied in Pakistan, Viet Nam, Saudi Arabia, the Philippines, Indonesia and other developing countries.

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Improved and alternative production technology

117. Diaphragm electrolysis of metal

Technology overview

Functions and use: The main raw material of the chlor-alkali industry is industrial salt from which, by means of electrolysis, it produces such products as caustic soda and, chlorine. All its main products are basic chemical raw materials and are widely used in the light industry, chemical, textile, building material, national defense and metallurgical fields.

Scope of application: The technology can be applied in any region where water, electricity and gas resources are readily available. In addition, local salt reserves or salt transportation capacity also needs to be taken into account.

Technological features: Unlike the mercury electrolyzer, the diaphragm electrolyzer with its metal anodes does not produce mercury contamination. It does not require pollution treatment and can reduce direct current consumption by 750kWh per ton and total energy consumption (converted to alternate current) by 190kWh/t.. Unlike the ion film electrolyzer, the technology does not have strict requirements for the SO_4^{2-},Ca^{2+},Mg^{2+} content of the salt water entering the electrolyzer. The diaphragm electrolyzer with metal anodes is easy to manufacture and assemble, and requires minimal daily maintenance. It is an mature energy-saving technology which is suitable for use in developing countries and can improve the operating environment.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

It has been promoted and applied in Vietnam, including basic design, detailed design technical services and set equipment transfer.

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Improved and alternative production technology

118. Vacuum heat treatment technology and equipment

Technology overview

Functions and use: Vacuum heat treatment can handle almost all heat treatment processes, such as quenching, annealing, tempering, carburizing and nitriding. In the quenching process, gas quenching, oil quenching, nitrate quenching and water quenching as well as vacuum brazing, sintering and surface treatment can be performed. Vacuum heat treatment offers high furnace heat efficiency and fast temperature rise and fall. It can achieve zero oxidation, zero decarburization and zero carburization and remove phosphorus debris from workplace surfaces. It also has the role of degreasing and gas removal.

Technical information: In accordance with customer requirements, provides various vacuum furnaces with various functions (quenching, annealing, tempering, carburizing, nitriding, brazing and sintering) and specifications.

Scope of application: This technology is used in the quenching, solid solution, ageing treatment and surface treatment of metal materials, stainless steel and various precision alloys, the sintering of diamonds and the brazing of different materials.

Technological features: The vacuum heat treatment process offers good stability, repeatability and less power consumption. It only consumes 80% of the electricity consumed by conventional heat treatment, thus carrying low production costs. Vacuum heat treatment is safe to operate and highly automated. With a good working environment and no pollution, it meets the clean production and sustainable development demands of industrial enterprises in China.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

The vacuum heat treatment technology has been promoted and applied in Southeast Asia. More than 30 sets of equipment have been transferred, all producing good application effect.

Technology Provider

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South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

Energy conservation and emissions reduction technologies for civil and commercial use

Electrical products for civil and commercial use are the daily necessities. The energy consumption by these products is also a source of GHG emissions. The R&D and application of energy-saving electrical products (TV sets, refrigerators, air-conditioners, computers, etc.) and CFC substitutes will reduce energy consumption, emissions and people's living cost.

119. Energy saving lamp

Technology overview

Functions and use: Energy-saving electric lamps are a type of self-ballasted fluorescent lamp for ordinary lighting.

Technical information: (1) Luminous efficiency. The lamp tube adopts high-efficiency rare earth trichromatic phosphor, with an average luminous efficiency of 65LM/W. It offers high brightness and saves electricity consumption by 80% on incandescent lamps; (2) power factor: 0.96; (3) power: 5W- 105W; (4) color-rendering index: Ra＞82; (5) service life: >8,000h (lamp tube: >6,000h).

Scope of application: Wide-ranging civilian and commercial lighting fields.

Technological features: Compared with incandescent and fluorescent lamps, energy-saving electronic lamps offer such features as low power, high luminous efficiency and long service life. Compared with LED, such lamps are cheaper and easier to implement and use, have wider applications and need no maintenance.

Status of application

Mature product; ready for use without training; inexpensive to use, and maintenance-free.

It has been widely used in Brazil, Iran, India and other developing countries and produced good results.

Technology Provider

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120. LED road light

Technology overview

Functions and use: Lighting for road.

Technical information: Structure: Extrude Aluminum, toughened glass; Abstract heat type: Whole lamp; LED luminous efficacy: ≥100-107LM/W; LED Module luminous efficacy: > 82 Lm/ W; Color Temperature: 3000K(Cold white)/6000K(Warm white); Ra: 80.5; Viewing Angle: ≥130° ;Voltage: DC12V/DC24V/AC220V; Power: 9W-150W; PF: ＞0.95; Working Temperature: -30℃-70℃; Slow Light weakening: ＜10%/3year; Protection grade: IP65; Size：700 mm (L) ×240 mm (W) × 90 mm (H); Work life:＞50000Hrs.

Scope of application: Lighting for countryside road, city road, square, garden, yard, tunnel etc.

Technological features: The whole extruded Aluminum cover for cooling. High light efficiency, high power factor, long working life. Compared with traditional road light, LED road light can save energy up to 82.6%.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; ready for use without training; high initial input cost but low subsequent use cost.

Technology Provider

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121. Cold refrigerant heat pump water heater/air conditioner

Technology overview

Functions and use: The heat pump water heater/air conditioner is an integrated machine which combines water heating and air conditioning into one unit. While enjoying energy-saving hot water, users can also get free cold air. While not heating water, the system is an independent air conditioning system. When air conditioning is not being used, it is an air energy-based water heating system. More importantly, the combination saves maximum energy for the air conditioner and water heater, 2 of the most power-consuming home appliances.

Technical information: R290 refrigerant as a natural media has zero ODP and near-zero GWP. Featuring low price and outstanding environmental adaptability and thermal physical properties, it meets environmental requirements and those of heat pump water heaters/air conditioners.

Scope of application: Applicable to daily home life and small commercial premises where hot water and cold air are needed.

Technological features: (1) Environment-friendly. Uses R290 natural working media refrigerant, and a green product; (2) energy-saving. Saves significantly more energy than traditional electric water heaters; and (3) hi-tech. Full smart control, automatic startup and switch-off; fully automatic defrosting function; high adaptability, and 24h use under all weather conditions.

The machine consists of 3 parts: an outdoor machine, an indoor machine and a hot water supply system. Automatic system circulation is adjusted according to demand. When only hot water but not cold air is needed, the high temperature, high pressure refrigerants of the system are controlled, via electric control and its switch, to flow into the hot water supply system. A heat exchange coil pipe is used to bring the heat carried by the refrigerants to heat up the water and store it so as to supply hot water. Cooled refrigerants return, after evaporation via the outdoor heat exchanger, to the compressor and complete one cycle.

Status of application

Has been promoted and applied; ready for use after simple training; high upfront cost but low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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122. Cyclopentane foaming technology

Technology overview

Functions and use: Through chemical reactions, cyclopentane foaming technology generates polyurethane foam, a heat-preserving material which possesses a certain degree of hardness and plays a supporting role - polyurethane foam.

Technical information: Foam compression strength, dimension stability, thermal conductivity, etc

Scope of application: Cyclopentane as a rigid polyurethane foaming agent is used to replace CFCS which damages the ozone layer. It is now widely used in making fluorine-free refrigerators, deep freezers, cold storage cabinets and pipeline insulation.

Technological features: Cyclopentane is an environmentally friendly substance which does not harm the ozone layer. With good heat preservation effect, it is now widely used around the world.

Status of application

Has been promoted and applied; special training is needed; high upfront cost but low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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123. Production line upgrade from ordinary air conditioners to high-efficient, energy-saving air conditioners

Technology overview

Functions and use: Retrofitting of products, production and test processes to convert ordinary air conditioners to efficient, energy-saving air conditioners. It mainly involves renovation of ordinary air conditioner production line, building efficient, energy-saving air conditioner production lines and optimizing enterprises´ product mix.

Scope of application: To retrofit ordinary air conditioner production bases and production lines, improve air conditioner efficiency and lower carbon emissions.

Technological features: The technological renovation offers the following main advantages: (1) safety and stability; (2) energy saving and environment friendliness; and; (3) low cost and low selling price.

Status of application

Has been promoted and applied; special training is needed; high upfront cost but low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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124. Energy-saving color TV technology

Technology overview

Functions and use: The technology is used for energy-saving of flat panel TV. As technology advances, flat panel TV screens are now becoming bigger and bigger. Accordingly, power consumption has also risen continuously. Flat panel TV has now become the 4th biggest energy-consuming home appliance, after air conditioners, water heaters and refrigerators.

Technical information: (1) standby power consumption can be lowered to 0.1W; (2) efficient power solutions are adopted to raise efficiency by 8% (past efficiency: 82%; current efficiency: 90%). Taking a 40inch TV set (power consumption: 250W) as an example, it saves 20W of power per set; and (3) combined power supply and lower power consumption, raising aggregate efficiency by over 15%. (past: PFC efficiency: 95%; DC-DC efficiency: 90%; DC-AC efficiency: 85%; aggregate efficiency: 72%; present: PFC efficiency: 95%; DC-AC efficiency: 92%; and aggregate efficiency: 87%). Taking a 42inch TV´ s 250W power consumption as a benchmark, it can save 37.5W of power. Dynamic back light technology is adopted to gain more than a 30% saving on energy. Taking a 42inch TV set ((power consumption: 250W) as an example, it saves 75W of power per set.

Scope of application: Commercial and public display equipment.

Technological features: (1) Integrates ultra low standby power supply technology and IP integration technology; (2) adopts energy-saving, power-saving technology; and (3) adopts green design technology.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; no training is needed; low cost of use; and maintenance-free.

Technology Provider

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125. Green compound foaming technology for high-efficient, energy-saving refrigerator

Technology overview

Functions and use: Through the integrated application and innovation of HFC-245fa foaming technology, cyclopentane low-density, low conductivity technology and foaming additive technology, upgrading and renewing the traditional refrigerator industry, effectively improving refrigerator product performance and energy conservation, greatly lowering the use of harmful and foaming materials in refrigerators and reducing the destruction of the ozone layer.

Technical information: (1) Foam thermal conductivity K: 0.0180-0.0190W/mK; (2) foam core density range: 28-32kg/m^3; (3) foaming process solidification time: 200-300s; and (4) refrigerator´ s energy consumption can be reduced by 8% on average.

Scope of application: Can be used on domestic refrigerators and commercial freezers.

Technological features: (1) better foam heat preservation performance and power consumption than the HCFC-141b system, and over 8% better than the cyclopentane foaming system; (2) foam plastic cost is down by 10%; (3) refrigerator quality is better than the current level; and (4) ODP=0, and environment-friendliness.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; special training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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126. Langchao high-efficiency server

Technology overview

Functions and use: Langchao´ s high-efficiency server can balance the contradiction between the waste of computing resources and server power consumption. By increasing the server installation density inside the rack, it achieves a rational balance during peak consumption hours so as to optimize power consumption. By allocating power on demand, it reaches an effective balance among a set of servers. In emergency situations, it can set up the energy saving policy for dynamic power node magnet and immediately lower power consumption. The energy saving policy can be adjusted in response to the requirements of different application environments.

Technical information: (1) Changes processor speed, dynamically switches on/off the number of CPU kernels and provides performance on demand. (2) Through effective internal memory read/write frequency controls and refreshes voltage and lowers the current, reducing the power consumption of the internal memory. (3) When hard disk is idle, enters sleep mode and reduces power consumption, waking it up when needed for use. (4) Adopts high-efficiency (80) PMbus power supply to read system temperature and power consumption in real time. (5) Adopts fan adjustment technology to regulate fan revolution in real time and achieve a balance between power consumption, heat diffusion and noise.

Scope of application: The high-efficiency server has been used in the Internet industry, where computing intensity is high and computing volume changes with time, and produced notable results. It can also be widely used in IDC machine rooms and various industries.

Technological features: The high-efficiency server adopts dynamic power supply node management technology. Through an integrated software and hardware design at the parts, component, system and solution levels, control key system components (CPU, internal memory, hard disk, power supply and heat-diffusing fan) to save energy and lower consumption.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; ready for use after simple training; inexpensive to use, and users can carry out their own maintenance.

It has been widely used in a number of South American, African and Asian countries.

Technology Provider

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127. Internal combustion-type gas stove

Technology overview

Functions and use: Energy-saving, concentrated and inward-revolving flames burn inwards along the periphery of the fire cover. Under the action of the centripetal force, the flames are in a spiral state and burn around the pot bottom. The conically distributed flames can burn at the cooker bottom and greatly improve thermal energy use efficiency.
Technical information: Fire cover die casting process, gas stove production process.
Scope of application: Cooker.
Technological features: Improves thermal energy use efficiency, low waste gas emission, and is equipped with an automatic extinguishing protection device to effectively prevent gas leakage.

Status of application

Can be put into commercial production in developing countries; mature product; simple training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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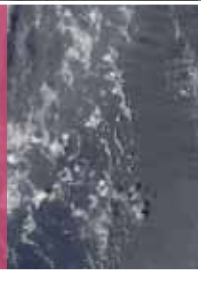
South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

Disaster prevention and mitigation technologies

Over recent years, the world has been frequently hit by extreme natural disasters such as hurricanes, heat waves, torrential rain, cold snaps, floods and droughts which severely affect people´ s lives. Developing countries in particular, have suffered from considerable losses of lives and wealth. The monitoring and forecast of meteorological disasters like drought enable countries to manage and prevent catastrophic weathers so as to minimize possible losses.



Disaster prevention and relief

128. Soil moisture auto-detector

Technology overview

Functions and use: Based on detector-generated electromagnetic waves´ frequency changes in materials with different dielectric constants, Gstar-I Soil Moisture Auto-Detector adopts an established mathematical model to calculate soil moisture content. It features continuous monitoring, high data accuracy, simple installation, no destruction to soil layer structure, no radioactivity and the ability to measure soil content at different depths.

Technical information: Resolution: 0.1% volumetric soil moisture content; accuracy: ±2% volumetric soil moisture content; and measurement range: 0～100%Vol volumetric soil moisture content.

Scope of application: Can be used to measure moisture contents in soil and other substances at different depths.

Technological features: Stable, reliable and high precision sensor; powerful communication network interface; and professional data processing capacity.

Status of application

Mature product; no training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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Disaster prevention and relief

129. Digital landslide technology

Technology overview

Functions and uses（1）disaster forming background investigation and research: as the meteorological satellite can monitor the rainfall intensity and precipitation on a real-time basis, not only the land resource satellite has the capability to investigate the ground objects in a comprehensive and systematic manner, but also its infrared waveband and microwave waveband has the function of investigating and analyzing the characteristics of the shallow-lying objects under the ground.（2）Investigation of current status of geological hazards and division of areas: divide the areas susceptible to geological hazards, assess the degree of susceptibility to provide basic data for prevention and control of geological hazards and establishing the geological hazard monitoring network.（3）dynamic monitoring and early warning of geological hazards: as the differential accuracy of the GPS reaches the millimeter level, it can meet the accuracy requirements for monitoring of creeping disaster body. Hence, using the GPS system, entire-process dynamic monitoring of geological hazards may be carried out and on this process, effective forecast, reporting, and imminent report and warning of geological hazards may be performed.（4）real-time (quasi-real time) disaster investigation and loss assessment: Using remote sensing technology for geological hazards investigation, except that it is difficult to count the personnel and livestock casualties, the damages of the engineering facilities and natural resources may be investigated and assessed in a real-time (quasi-real time) manner, which might provide accurate basis for the disaster rescue and relief work.

Technical indicators: 1: 250,000 - 1: 50,000 regional landslide geological environment, information retrieval and evaluation; 1: 2000 - 1: 10,000 single large landslide investigation, monitoring and analysis of the causes and risk assessment.

Application scope: Applied to the survey, monitoring, hazard warning and hazard assessment of slump-flow of secondary disasters caused by earthquakes, tsunamis, volcanoes and other disasters , mountain hazards caused by extreme weather conditions such as heavy rainfall and large-scale melting of glaciers, collapse, landslides, mudslides and other disasters caused by human´ s engineering activities such as reservoir storage, road excavation, and mining; emergency investigation and monitoring of geological hazards of sudden landslide.

Features: carry out multi-scale landslide disaster investigation, monitoring and analysis of hazards rapidly, and in the meanwhile perform real-time (quasi-real time) investigation, dynamic monitoring and loss assessment of the sudden geological hazardous.

Status of application

Has been promoted and applied; can be put into industrial production in developing countries; simple training is needed; maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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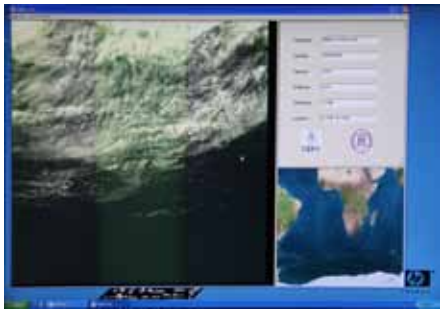
Disaster prevention and relief

130. Natural disasters monitoring and prevention information system



Technology overview

Functions and use: Based on free data received from such remote sensing satellites as TERRA/AQUA and China´ s CBERS series, the system provides various types of meteorological information and generates the corresponding remote sensing images. It can be used in the monitoring and prevention of floods, fires, droughts and other natural disasters as well as in the post-event assessment of natural disasters and earthquakes.

Technical information: TERRA/AQUA satellite image resolution: 250m; CBERS satellite image resolution: 2.36m. Image information is received no fewer than three times each day. It can provide infrared, visible and other formats of information and images.

Scope of application: Flood monitoring and early warning; forest fire monitoring and early warning; drought monitoring and early warning and post-earthquake disaster monitoring

Technological features: Small antenna aperture, low cost, and widely used in China.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is needed; low cost of use; high upfront cost but low cost of use; and users can perform their own maintenance.

The relevant equipment has been used in CSIR remote sensing stations to receive CBERS02B satellite images in South Africa.

Technology Provider

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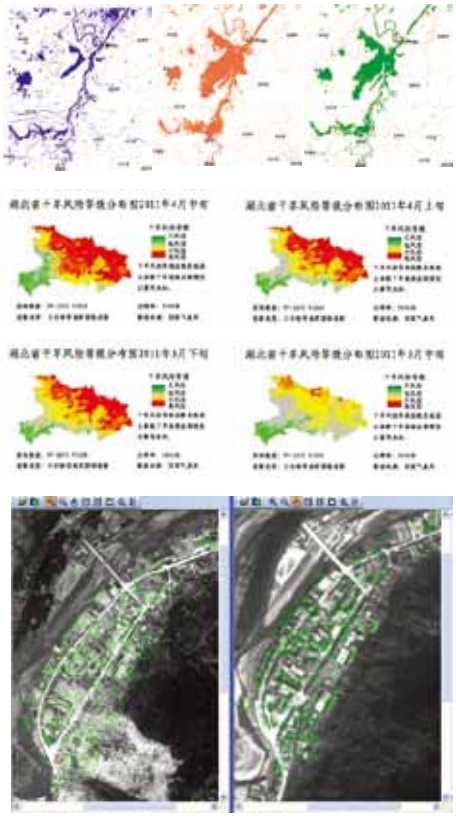
131. Remote ensing based disaster information extraction and analytical system

Technology overview

Functions and use: Based on dataset received from remote sensing sensors including MODIS onboard TERRA/AQUA satellites, China´s HJ-1A/1B CCDS, and other high spatial resolution detectors, the natural disasters information characteristics of flooding, drought, fire, snow, earthquake, sand-Dust Storm, heavy fog, diseases and insect pests can be extracted. The level of risk for each kind of disasters can be generated. The economic loss from disaster can be estimated. It can be used in the monitoring and prevention of natural disasters, loss estimation, and post-disaster reconstruction.

Scope of application: disaster monitoring and early warning; disaster loss estimation, post-disaster reconstruction.

Technological features: low cost, and widely used in China.



Status of application

Has been promoted and applied; Simple training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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Remote sensing

132. Remote sensing-based grain acreage measurement and yield estimation for grain crops

Technology overview

Functions and use: Supported by an on-site sampling survey system, fully leverages the advantages of 3S technologies, achieves full acreage measurement and yield estimation for major grain crops, and provides timely, accurate and reliable data.

Technical information: (1) ″The crop acreage and yield estimation remote sensing operation system″ can make acreage measurement and yield estimation for the 3 main cereal crops of wheat, corn and rice; (2) crop acreage and yield estimates at the county level are better than 95 at 97% confidence level; and, (3) gets acreage measurements for wheat, corn and rice (early, middle and later season rice) at a specified time each year.

Scope of application: Land resources, agriculture, forestry, environment and water conservancy.

Technological features: Remote sensing technology is used to get timely and accurate crop acreage data. This is of great significance for formulating agricultural production and rural policies and offers a good reference for improving traditional statistical means.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; special training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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133. Remote sensing satellite

Technology overview

Functions and use: Used for remote sensing. CAST1000 and CAST 2000 are small-sized satellite platforms which offer high performance, expandability and flexibility. The platforms feature wide sway maneuvering and flexible altitude maneuvering.

Technical indicators:

Aggregate satellite mass:	<800kg
Payload MASS:	<400 kg
Orbit type:	Sun synchronous return orbit
Average orbit height:	644.547km (could be changed according to customers´ needs)
Dimensions:	1310mm × 1300mm × 2000mm
Data transmission band:	X band, single channel
TT&C system	S band tele-measurement and tele-control, and supports multi-business system

Scope of application: Widely used for various types of flight mission, e.g., earth observation, ocean observation, disaster assessment, space environmental exploration, technological verification, scientific exploration, earth environmental exploration, formation flight and networking, meteorological research and applications, communications, navigation, etc.

Technological features: Good technological success, relatively short development cycle and cost-effective.

Status of application

Mature product; ready for use after special training; high first-time input cost but low subsequent use cost; maintenance-free; and low maintenance cost.

Technology Provider

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Remote sensing

134. Communication satellite

Technology overview

Functions and use: As an important type of application satellite, the communication satellite is widely used in people´ s daily lives. Drawing upon their wide regional coverage and different payloads, communication satellites can provide services to specified areas on the Earth

Technical indicators:

	DFH-4 communication satellite
Satellite Dimensions	2360mm (X) × 2100mm (Y) × 3600mm (Z)
Payload bearing capacity	600kg
Orbit type	GEO or other orbits
Designed in-orbit life	15 years

Scope of application: Suitable for medium and large capacity communications and broadcasting, regional mobile communications, weather, navigation, broadband multi-media and other applications.

Technological features: DFH-4 is a large capacity, long service life satellite platform independently developed by the China Academy of Space Technology (CAST). It adopts the commonly-used 3-axis stable mode. Its output power and communication capacity can rival those of internationally-known platforms.

Technology Provider

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Status of application

Mature product; ready for use after special training; high first-time input cost but low subsequent use cost; maintenance-free; and low maintenance cost.

So far, CAST has delivered 2 DFH-4 satellites to Nigeria and Venezuela. It has also signed aDFH-4 satellite contract with Laos.

135. Fixed ground receiving station for remote sensing satellite

Technology overview

Functions and use: The main function of the ground station is to receive and process all kinds of data from remote sensing and meteorological satellite. The station can control and schedule the operation of its ground equipment, support compatibility with several remote sensing satellites, and perform unified management and scheduling and realize 24-hour automatic business operations under centralized station scheduling and control.

Technical information:

Receiving frequency range for telemetry signal:	2.2-2.3GHz;
Sending frequency range for telemetry signal:	2.025-2.12GHz
Receiving frequency range for remote sensing data transmission:	8-9GHz

Scope of application: Processed satellite images can be widely used in observation, land resources survey, oil field and water source monitoring, disaster detection and urban planning. It plays an essential role in spacecraft mission planning, mission and target area visualization, intelligence assessment, map preparation, and other topographic applications.

Technological features: Stable operation, high reliability, modular design, compatibility with multi remote sensing satellite data receiving and processing, ergonomic design, cost effective, and excellent expandability.

Status of application

Mature product; ready for use after special training; high first-time input cost but low subsequent use cost; users can perform maintenance on their own; and low maintenance cost.

Technology Provider

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Remote sensing

136. FY-2 Geostaionary Meteorological Satellite Command and Data Acqusition Station (CDAS)

Technology overview

Functions and use: CDAS is a large-sized ground station for meteorological satellites developed by CAST. It is a multi-carrier wave grand station which encompasses satellite service tele-measure/tele-control, raw cloud image receiving/processing and broadcasting cloud image sending, and meteorological data collection. Its data can be shared globally. Through meteorological satellites, the CDAS station and satellite monitoring and forecasting system, it is possible to effectively monitor and forecast various disasters, including typhoons, rainstorms, snowstorms and so on.

Technical information:

Antenna diameter:	12m
Working frequency:	X band, L band

Scope of application: Widely used in the fields of meteorology, ocean, aviation, hydropower, earthquakes, environment protection, port, forest, architecture, warehousing, fishing, scientific research, oil, transportation and agriculture. It is an important means of monitoring real time weather phenomena such as typhoons and rainstorms.

Technological features: Good compatibility, can receive data from designated meteorological satellites and other satellite data.

High reliability: combines equipment of the international standard and independently developed equipment; performs strict quality control on components and devices, comprehensive reliability design and reliability tests and verification

High level of automation and allows unmanned operations.

Status of application

Mature product; ready for use after special training; high upfront cost but low cost of use; users can perform maintenance on their own; and low maintenance cost.

Technology Provider

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Health technologies

Climate change is posing severe threat to human health. It will affect tens of millions of people with heat-induced diseases. Therefore, it is vital important to use traditional and bio-medicine in the prevention and treatment of malaria, dengue fever, cholera and other infectious diseases, improve health standard and reduce death rate.

South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual

Tropical Disease Prevention and Control

137. New malaria prevention method

Technology overview

Functions and use: It can effectively cure existing cases of malaria and provide a 28 day protection period for people who are not yet affected, with a protection rate of 98%. It can be widely used in the prevention of malaria for highly susceptible groups in malaria-prone regions.

Technical information: Drug administration once a month, 28-day protective period and 98% effective protection.

Scope of application: Malaria-endemic countries, and malaria prevention for all people.

Technological features: This drug has been included in the WHO´ s latest drug use guide directory. The product is safe and effective, with low toxicity but high protective efficacy.

Status of application

Has been promoted and applied; special training is needed; low cost of use; and maintenance-free.

Technology Provider

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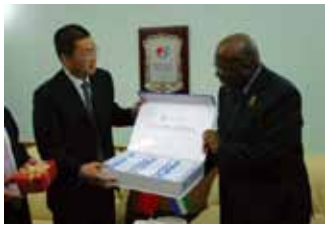

Tropical Disease Prevention and Control

138. Technology of fast malaria elimination by artemisinin-based combination

Technology overview

Functions and use: Together with mass prevention and control, mass drug administration, health education, personal health training and local malaria prevention systems, Artequick can reduce the malaria mortality rate to zero and the incidence rate by 90% in 3 months. It can transform areas highly prone to malaria-endemics into low malaria areas. It is the newest and fastest malaria control technique currently available in the world.

Technical information: 1. The artemisinin-based combination therapy (Artequick) plus a low dose of primaquine can stop the asexual plasmodium in the human body from growing in 2 hours, clear 95% of the parasites within 24 hours and force the gametocyte to lose infection with mosquito vector in 24 hours, thus blocking the transmission between the infected people and the mosquito vector. 2. Two rounds of mass administration of Artequick, can reduce malaria incidence rate by 90% and mortality rate to zero in malaria-endemic areas.

Scope of application: This technology is suitable for malaria endemic regions in developing countries, especially highly endemic regions. It is even easier to implement on islands and similar regions with relatively closed environments.

Technological features: The innovative artemisinin-based combination therapy developed by Chinese scientists offers such advantages as high efficacy, quick effect, low toxicity and easy drug administration. Through combination of prevention and treatment, early diagnosis and treatment, it can maximally put such advantages into use and substantially reduce the risk of malaria for people living in endemic areas.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is needed; low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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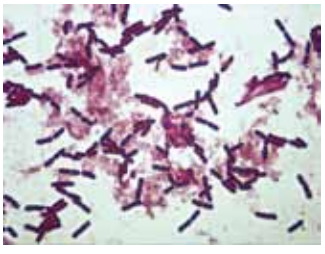
Tropical Disease Prevention and Control

139. Manufacture and application of microbial larvicide for mosquito control

Technology overview



Functions and use: Isolates Bacillus thuringiensis (Bti), Bacillus sphaericus (Bs) and other mosquito pathogens and through fermentation, manufactures microbial larvicides to prevent the formation of mosquito larvae and control the spread of dengue fever, malaria and other diseases.

Technical information: Uses BS, BTi and other microorganisms to kill mosquitoes. Reduces mosquito larvae density by 76-91%, adult mosquito density by 70-73% and mosquito-borne diseases by 80.1%.

Scope of application: Used to prevent the formation of Culex, Aedes and mosquito larvae in outside environments, and control the spread of dengue fever, malaria and other diseases.

Technological features: Microbial larvicide offers outstanding features such as focus of targets, high efficiency, no toxic or side effects to nature or humans, no environmental pollution, difficult formation of drug resistance and low cost of production and application. It can effectively control mosquito density and control the spread of diseases.

Status of application

Has been promoted and applied; can be put into commercial production in developing countries; mature product; simple training is needed; low cost of use; and users can perform their own maintenance.

Technology Provider

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140. Tropical disease prevention, control and monitoring technology

Technology overview

Functions and use: Monitors and prevents malaria, dengue and other diseases, and lowers incidence rate.

Scope of application: Regions with malaria, dengue fever and other epidemics.

Technological features: Low cost, and can well prevent and control disease. For better prevention and control effect, regional joint prevention and control may be adopted to maintain human health.

Status of application

Has been promoted and applied; special training is needed; low cost of use; and maintenance personnel need to be trained or a maintenance station needs to be established.

Technology Provider

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Others

141. Recombinant protein drug production technology

Technology overview

Functions and use: The scope of applicable indications covers diseases and renal cell carcinoma, melanoma and other malignant tumors caused by Hepatitis B virus, hepatitis C virus, HIV, herpes virus, avian influenza virus and enteric viruses. Based on a technological platform, various products have been industrialized, including recombinant human interferon (INF α), recombinant human granulocyte colony stimulating factor (G-CSF), recombinant human granulocyte macrophage growth factor (GM-CSF), recombinant human growth hormone (GH), interleukin (IL-2, 15) and Hepatitis B vaccine

Technical information: All the successfully developed products have reached the national quality standard and even European and American quality standards.

Scope of application: This technology can be used for the development of, piloting and industrialization of recombinant protein drugs which have E. Coli and yeast as the engineering strains. It has a wide range of applications.

Technological features: The technology provider has developed various recombinant protein drug preparation technologies. It has over 7 years of operational experience with 2 GMP production lines which are mainly used to develop recombinant protein drugs and immunity regulating drugs. Adopting a fully automatic module production mode, it can achieve control over ″bacteria, viruses and pyrogens″ in the production process and strictly guarantee product quality.

Status of application

The technology has been promoted and applied; can be put into industrial production in developing countries; mature product; special training is required before use; high initial input cost but low subsequent use cost, and users can carry out their own maintenance.

Taking the interferon α2b project as an example, there is a strong demand for biological products represented by α2b in Asian countries like Pakistan and some Middle East countries like Syria. Governments there greatly support it. Currently, enterprises in the regions mainly start with semi-finished product packaging and are expected to introduce the whole set technology in the long run.

Technology Provider

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Organizations

South-South Cooperation on S&T to Address Climate Change

Applicable Technology Manual


中国科学技术交流中心
China Science and Technology
Exchange Center

China Science and Technology Exchange Center (CSTEC)

Founded in 1982, CSTEC is a national independent legal entity in China. Through international science and technology exchanges, CSTEC aims to push forward cooperation between China and the world and propel China´ s socio-economic progress. It has already established partnership with more than 130 organizations and famous enterprises in about 30 countries and regions worldwide. It is playing an important role in scientific communication with countries in America, Oceania, Europe, Asia and Africa, and regions like Hong Kong, Macao and Taiwan. One of CSTEC's major tasks is to push forward South-South S&T cooperation on climate change, and support technology R&D, transfer and training activities among developing countries in this aspect.

www.cstec.org.cn

Gansu Natural Energy Research Institute (GNERI)/ UNIDO International Solar Energy Center for Technology Promotion and Transfer (UNIDO -ISEC)

GNERI founded in 1978, is mainly engaged in the studies and application of new and renewable energies, and solar energy techniques in particular, national and international technical cooperation and trainings, technical consultation and exchange. It is an Associated Institution of United Nations University within the overall framework of the UNU Environment and Sustainable Development Program, as well as UNIDO international solar energy agency for technology promotion and transfer(UNIDO -ISEC). The GNERI-developed solar water heaters, solar cookers and photovoltaic products also hold an important share in the domestic and international market. By the end of 2010, about 230 world famous experts have paid visits and given lectures or had technical exchanges at GNERI, and 3200 ambassadors, scientists and governors in total from more than 110 countries (including 9 Presidents and Prolocutors, more than 100 Ministers) have visited GNERI.

1. Outdoor Solar Collector

2. Technology of Passive Solar Building: the appropriate choice of building orientation and the surrounding environment building materials, structures to contribute building heating and cooling. The passive solar building is low cost and easy maintenance.

3.An Auto-controlling Mode of the Active Solar Heating System: It can discriminate variations of the weather automatically, also is able to control the active solar heating system established in various areas.

4.Heat Pipe Evacuated Tubular Solar Collector: the collector possesses characteristics such as, no water in the vacuum tube, tube never broken. anti-precipitation, anti-freezing.

5.Solar street lights, garden landscape lamp, lawn lamp, solar power station integrated construction project design, construction

6.Solar Photovoltaic Power Generation Component of Oblique / Flat Single Axis Tracking Device

7.Semitransparent Air Interlayer Insulation Photovoltaic Component: both lighting and power, and can be widely used for building walls and roofs.

8.Solar Cooker: Boil water, cooking and fit for farmhold and small-size agencies, may be used in the scale of production,small investment.

9. Photovoltaic DC Pumping Systems

10. Solar Drying System

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International Center on Small Hydro Power (ICSHP)

ICSHP is a public and non-profit institution directly under auspices of United Nations Industrial and Development Organization (UNIDO), China´ s Ministry of Water Resources (MWR) and Ministry of Commerce (MOFCOM), as well as, ICSHP is headquarters of International Network on Small Hydro Power (INSHP), which is an international organization with more than 300 members from 70 countries. ICSHP established 4 pilot bases on SHP in China, and 3 sub-centers in India, Nigeria and Colombia.

ICSHP aims at the promotion of global SHP development through triangular technical and economic cooperation among developing countries, developed countries and international organizations, hence to supply the rural areas in developing countries with environmentally sound, affordable and adequate energy, which will lead to the increase of employment opportunities, improvement of ecological environment, poverty alleviation, energy security, improvement of local living and cultural standards and social-economic sustainable development in rural areas.

Since it was established in 1994, ICSHP has trained over 700 engineers from 50 countries, provided technical consultations, feasibility study, design, equipment supply and installation on SHP in over 30 developing countries, organized more than 30 international conferences/workshops both in China and abroad, and successfully compiled the first SHP Clean Development Mechanism (CDM) project in China. Through the international cooperation activities, China´ s practice and experience in SHP have been widely disseminated world wide.

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Chinese Academy of Agricultural Mechanization Sciences (CAAMS)

CAAMS is a comprehensive enterprise, which provides equipment, technological service for the fields of agricultural machinery and food equipment development, mechanical & electric products manufacturing as well as the domestic and foreign trade.

CAAMS functions as the country's representative to participate in the activities of ISO/TC23 for agricultural and forestry tractor and agricultural machinery, and serves as the national standard organization of agricultural machinery and implement. CAAMS is also an authorized State laboratory for the inspection of import and export of Agricultural Commodities under the state Administration for Import and Export Inspection. CAAMS has conducted extensive International exchanges for years. The Center has held several international Conferences, seminars and international training courses of agricultural and food processing machinery technologies facing the developing countries, which has earned great support from the central government.

CAAMS is the largest research organization with the strongest innovation ability engaged in fundamental, application sciences with multiple disciplines, comprehensiveness and gives priority to R&D on modern agriculture equipment while facing the needs of agriculture, countryside and farmers.

1、Main technologies & Products：Tillage machinery, seeding machinery, plant protecting machinery, harvesting machinery, water saving machinery, drying machinery, grassland construction and engineering for animal husbandry， feed processing, agro-products processing, rural energy equipment

2、International Training Program: Entrusted by central government, CAAMS has conducted the international technical training programs from 1989 and received 1000 add members from 70 developing countries. A number of bilateral cooperative projects and international cooperation has been undertaken under the administration of central government.

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Xinjiang Tianye (Group) Co., ltd.

Xinjiang Tianye (Group) Co. Ltd is large state-owned enterprise under The Xinjiang Production and construction Co and one of the China top 500 company. The branch, Xinjiang Tianye Water Saving Irrigation System Company listed in Hongkong in 2006. The group involve in many industries, such as high irrigation irrigation equipments, plastics, chemicals, foodstuffs, thermoelectricity,mine , foreign trade and so on. By the end of 2010, the total assets of group reach to more than 4.2 billion with 40% average development rate. Production capacity of high efficient irrigation equipments, and PVC resin is no 1 in China,which could meet the requirement of 70 million of area for equipments, and the PVC pipeline capacity is 400,000 tons/year. ″Tianye drip irrigation system″ with low price and reliable characters that common Chinese farmer could afford have been applied more than 2.5 million ha, more than any others in the world. It has been spread into more than 29 domestic provinces such as Ginsu, He nan, Hebe, Jilin, Hei Long Jiang, Inner Mongolia, Hai nan etc, and other 13 countries including Kazakhstan, Uzbekistan, Pakistan, Mongolia, Angola, Zimbabwe and so on, the application area reach to 3500 ha. The high efficient irrigation technology is used on not only cotton, tomato, wheat,manse, but also rice, sugar cane, tobacco, soy bean, potato, alfalfa, and most of vegetables such as chilli and onion etc. In green house and orchard good results are achieved. Towards the objective of ″developing with the custom″ and based on many years application, it has been established one complete set of service system including plan and design, equipments supply, construction and organization, guiding and training to serve custom better.

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Institute of Arid Agroecology, Lanzhou University

Effective Utilization of Rainwater and Dryland Agriculture:The solution is to address dryland water stress and drinking water problems, greatly improve the productivity of dryland crops and water use efficiency, and reduce soil erosion and increasing vegetation cover.

2.Crop Eco-Physiology and Germplasm Resource Initiatives

3.Soil Ecology and Plant Nutrient Science

4.Agricultural Ecological Informatics:Combining the 3S system (Remote Sensing, Geographic Information System, Global Position System), ecology model and sensor network technologies, building the dryland agriculture assessment and management system, provide information and assistant tool for policy maker.

5.Vegetation Ecology and Desertification Control

6.Global Change Ecology:We focus on the impacts of climate change on ecosystem and investigation of a sustainable and low-carbon-emission development strategy for these areas.

7.Social Ecology: to ultimately reveals the effects of human social processes on coupling human and natural system.

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Institute of Agricultural Environment and Resource (IAER), Shanxi Academy of Agricultural Sciences

Founded in 1959, the institute mainly engages in the R&D, training and demonstrative applications in sustainable use of soil resources, agro-ecological environment protection, highly efficient use of fertilizers, drought early warning and other related fields.




The achievements in scientific research include more than 70 research achievements, 5 national patents, more than 520 published papers in academic journals, of which 18 papers in SCI, and 58 papers in the journals of national level. A large number of high-tech products are researched and developed. A new pattern, which focuses on both the applied basic research and scientific research conversion, has been gradually formed.

The institute values the international cooperation in research. The collaborative research has been carried out with Japan International Cooperation Agency (JICA), Australia Melbourne University, Dutch Wageningen University, Russian Academy of Sciences Institute of Biology, United Nations Environment Programme (UNEP) and other international organizations. In 2009, the institute has been awarded as the "International Cooperation of Ministry of Science and Technology Base" by Ministry of Science and Technology.

1. Research on sustainable utilization of soil resource

Researches are specific to issues including soil desertification, erosion, deterioration, salinization and pollution.

2. Research on protection of agricultural eco-environment

3. Research on plant nutrition and high-efficiency utilization of fertilizers

Sustainable agricultural development obtained via optimizing nutrition cycling, reducing nutrition input and increasing nutrition utilization efficiency

4. Cooperative research and development of drought early warning

5. Technical training, demonstration, application and propagation

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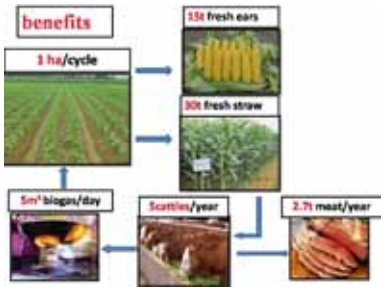
Foshan University

Foshan University is approved to be a full-time comprehensive undergraduate university. International co-operation and exchange link Foshan University to the world. Foshan University has always been actively involved in communication with many higher education institutions across UK, USA, Germany, New Zealand, Australia, Mozambique, South Africa and HK SAR, building up partnerships in the areas of teacher training, disciplinary development, academic exchanges, scientific research and management. Since 2004, Foshan University has been cooperated with Mozambique. During 2006-2008, Foshan University and Mozambique Mondlane University have been cooperated on ″Research on Introduction, Development and Utilization on rice and maize varieties in Mozambique″ , and during 2008-2011, Foshan University and Instituto de Investigacao Agraria de Mozambique (IIAM) have been cooperated on ″Research and Extension on the Key Technology of Grain Production in Mozambique″ supported by Science & Technology Ministry, P. R. China. From 2009, Foshan University has been cooperated with Tshwane University of Technology in South Africa. We are cooperating on ″Research and Extension on the Key Technology of Maize Production in South Africa″ (2009) and ″Studying on the Model of Modern Agricultural Circular Economy in South Africa″ (2010) supported by Science & Technology Ministry, P. R. China. The proposed ″Modern Agricultural Circular Economy″ (MACE) model is very suitable to promote and extend in the tropical and sub-tropical zones in Africa, and can make a huge economic impact. Through 8 years cooperation with Mozambique and South Africa, we have established strong foundation for cooperation in Africa.



Foshan´ s ″Modern Agricultural Circular Economy″ (MACE) model is suitable to promote in the tropical and sub-tropical zones.

(1)Sweet corn production. To produce sweet corn and straw feed to cattle production. sweet corn varieties which can be planted in tropical and sub-tropical zones, 15 tons of fresh ear and 30 tons of fresh straw can be harvested on 1 hectare of land per season;

(2)Cattle production. 30 tons of straw silage fodder can be used to feed a groups of cattle(n=5) per year, producing 2.7 tons of beef per year;

(3)Biogas production. 5 cubic meters of biogas can be produced by using the cattle´ s (n=5) manure per day.

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Gansu Research Institute for Water Conservancy(GRIWC)

Gansu Research Institute for Water Conservancy is mainly engaged on academic research, engineering design, consultancy, training and extension service on the field of water resources management, environmental conservancy, agricultural irrigation, rainwater harvesting, hydropower infrastructure, rural water supply. It shares strong professional advantage on water resources management, irrigation and global leading position on rainwater harvesting and utilization, The institute has supported Africa to build 2 pilot projects on rainwater harvesting in Nigeria and Algeria respectively, provided consultancy service for 9 countries in Africa, Middle East and Caribbean on water resources management, irrigation and rainwater harvesting, over 500 participants from 75 countries has participated training conducted by GRIWC. The institute acts as Secretariat of National Rainwater Harvesting Committee of China Hydrological Society.

Technologies from have been used in Nigeria, Algeria, Saudi Arabia, Kenya, Uganda, South Africa, North Sudan, Jamaica, Grenada etc.

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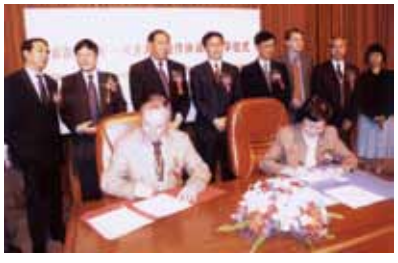
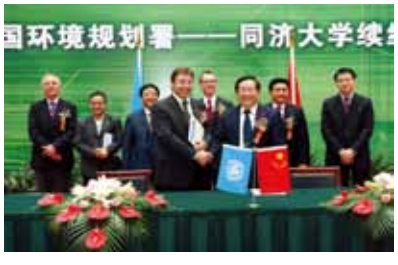
Tongji University

We provide water treatment agent including poly ferric sulphate (PFS) and polyaluminum chloride(PAC). PFS offers many advantages, such as no toxicity, wide applicable range of pH values, large alum, and rapid settling and has very good removal effects for COD, colors and heavy metal ions; it is cheap and used in small dosage; PFS has unique effects for the treatment of low temperature, low turbidity water and is widely used in the treatment of industrial wastewater and urban wastewater. It can be used for drinking water and wastewater treatment. In addition, we also provide comprehensive technologies for the treatment of drinking water and wastewater. With a systematic biological and chemical treatment processes, the pollutants such as heavy metals, nutrients and organic matter can be removed effectively.





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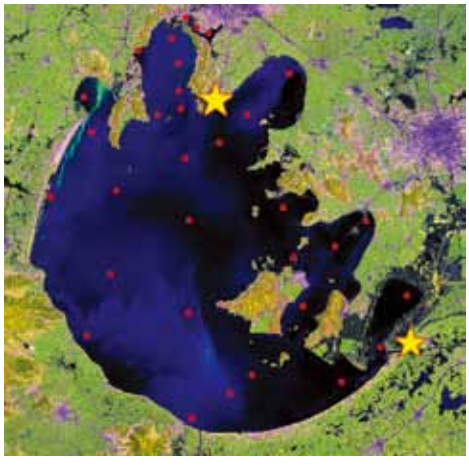
Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (NIGLAS)



NIGLAS is an institute specializing in the research of lake-basin system. NIGLAS can provide technical consulting service on water monitoring network design and monitoring practices include three main functions, the first is the comprehensive planning for water monitoring and management network in the lake or lake basin; the second is the technical consulting with field and laboratory practices and training; the third is the technology used for analyzing variation trend of water quality and the influencing factors, and providing information for the decision making facilitating both regional development and environment protection. It can be used in long term lake monitoring or water monitoring of lake basin, integrated survey of lake basin, strategic environment impact assessment, and other types of monitoring targeting special parameters.

Application: The technologies are matured, low cost, and can be maintained easily. The NIGLAS has provided the report on water quality and monitoring needs to the Lake Tanganyika Authority. Also the NIGLAS helps the Kigoma Center of Tanzania Fishery Research Institute to upgrade the water monitoring and analyzing laboratory.

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Institute of Botany, Chinese Academy of Sciences(IOB)

IOB is a comprehensive research institution for basic scientific research for plants in China. Up to now, IOB has won three awards of the first prize of National Natural Science Award, as well as about 160 awards of national, Chinese Academy of Sciences and provincial level scientific research awards.

During the ″12th Five-Year Plan, with the aim to building an international first-class institute, IOB focuses on the following five key research areas: systematic and evolutionary botany, vegetation and environmental change, molecular physiology and development, photosynthesis and renewable usage of plant resources. It is positioned as ″integrative plant biology″ and closely related to national strategy demand. IOB strives to achieve key breakthroughs on three aspects: the research of important plant resources and its industrialization, biodiversity and carbon function in the ecological system under global climate change and the mechanism of the transformation of light energy in photosynthesis, to lead and promote the development of integrative plant biology in China.

IOB obtained many technical achievements in applied research except for contributions in basic scientific research. Main technological achievements include in the following.

(1) Technologies in plant resources field: new grape varieties, seawater vegetables cultivation, post-harvest preservation of fruits and vegetables, new flower variety cultivation (lavender, peony for medicinal and oil, safflower).

(2) Technologies in vegetation and environmental change field: production and preservation of plant specimens, digital herbarium construction, ecological grassland restoration, new variety breeding and promotion of high-quality forage, ecosystem long-term monitoring and assessment, field station construction and management.

(3) Technologies in bioenergy field: development of new energy plants, bio-oil production, biological photocell, biological hydrogen production. In addition, new screen kit with SNP marker.

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Gansu Desert Control Research Institute(GDCRI)

Founded in 1959, GDCRI has been engaged in the research of theory and technologies on prevention and control of land degradation and sand encroachment, integrated desert control, eco-restoration, sustainable development of resources and oasis. Over 300 research results have been applied in practical work, which has offered scientific and technological supports to the development of the arid areas in China. GDCRI is maintaining a good scientific & technological cooperation with more than 40 countries/international organizations, and has trained over 700 scholars/officials/technicians from 69 countries all over the world, which are a great devotion to the desertification combating in the world.

Main technologies: Mechanical and biological measures for desert control; Introduction, domestication and reproduction of desert plants; Controlling of windblown sand-related harms; Integrated rehabilitation of desert area; Establishment of windbreak system; Eco-restoration; Integrated ecosystem management; Water-saving in desert area; Ecosystem monitoring; Development and utilization of the economic crops in desert area and their high-yield cultivation; Sustainable development of oasis; Deserticulture; Protection of bio-diversity; City greening in desert area; Restoration and management of desertified rangeland.

Products available: mechanical sand-barrier with diversified dimensions and materials; equipments/instruments for sand-driven wind observation and eco-environment monitoring; seeds/seedlings for sand-fixation afforestation, windbreak establishment and city greening; equipments/instruments for lysimeter and for sand and dust monitoring; soil water-conservation agent, sand-fixation agent, etc.




Services available: Services for applied technologies, products and equipments/instruments; designing and construction of engineering projects; technological cooperation, research and development; international training courses on desertification combating, eco-restoration and exploitation/utilization of desert resources can be conducted.

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Xinjiang Institute of Ecology and Geography(XIEG), Chinese Academy of Sciences

Focusing on the strategic objectives of the western development and under the guidance of the strategic thinking of creating innovative base by the CAS, the XIEG implements the strategies of resource development & utilization, ecological security and sustainable development in arid areas to carry out prospective, strategic and basic researches on "Oasis System Evolution and Oasis Ecological Agriculture", "Restoration of Fragile and Damaged Ecosystem and Prevention of Desertification", "Development and Utilization of Resources and Regional Sustainable Development", "Conservation and Utilization of Special Biodiversity", and "Resources and Environmental Monitoring and Decision-making in Arid Areas".

Main technologies: Mechanical and biological measures for desert control 、aforestation technique irrigated with high saline water in drift sandy area, afforestation and restoration techniques without irrigation in sandy area,, biological improvement techniques at alkaline land, breeding techniques of desert plants with stress resistances, optimal configuration techniques for shelter forest system, plantation techniques for high and stable yield in Cistanche deserticola Ma, plantation restoration technique with catchment, protection technique for desert-oasis ecosystem, restoration technique for degraded ecologyl , matching techniques for ecological restoration in desert area.

Products available: Sand control network with high duration, seed and seed belt of Cistanche deserticola Ma, Cistanche deserticola Ma health protection tea, various tree seeds and seedlings available for afforestation and landscaping, seeds and seedlings of desert economic plant, biochemical composite sand fixation materials.

Services available: Services for ecological applied technologies, products and equipments /instruments; designing and construction of engineering projects; technological cooperation, research and development; international training courses on desertification combating, eco-restoration and exploitation/utilization of desert resources.

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CHINA SOLAR VALLEY
中国太阳谷-世界未来之谷

China Solar Valley-World Future Valley

- First auto.solar water heater & vacuum tube production line in the world,
- The largest demonstration project of linear Fresnel solar thermal power station in Asia,
- The largest solar air-conditioning system in the world,
- Five solar water heater factories and eight vacuum tube production lines,
- 20 million vacuum tubes,over 3 million square meter solar collectors are produced here.

In the implementation of the Future Ark Project,China Solar Valley is now being built into an exemplary town and city for the world for the next 50 years.UTOPIA GARDEN is being built into a global human habitat model for 30 years to come.And the nine huge centers of China Solar Valley are being built into the future operation model of emerging industries in the next 100 years.

The nine centers include a word-class tourism center for renewable energy,world-class renewable energy R&D and test center,renewable energy international conference and exchange center,logistics center for renewable energy production,education and training center for renewable energy,solar popular science exhibition center,word-class exhibition center for low carbon science and technology,low-carbon human habitat demonstration center and low-carbon international business center.

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Chinese Academy of Forestry

Being a comprehensive research institution of multiple disciplines and public benefits that is directly subordinated to the State Forestry Administration (SFA), the Chinese Academy of Forestry (CAF) is mainly engaged in forest-related researches on applicable basic science, high-techs of strategic importance, and researches of significant social and public interests, technological R&D and studies on soft sciences, focusing on addressing the scientific and technological issues of holistic, comprehensive and fundamental significance. It is one of the academy´ s missions to provide technical support for the forest sector in China to address climate change, through its R&D of related technologies, translation and extension of research results and technical training as well as the international cooperation in the said field.



1.Forest ecological improvement and ecosystem restoration: technology of forest ecological network construction; responses of forest ecological system and its functions to climate change; technology of systematic construction and adaptive management of forests for various purposes; research on degradation of forest ecosystems and restoration; conservation of forest biological diversity and their value accounting; and etc.

2.Integrated desertification control technology; real-time monitoring, assessment, forecast and warning of serious sandstorms; integrated control and restoration of ecosystem in degraded arid lands and its sustainable development, and etc.

3.Conservation of wetland ecosystems: technology of wetland ecosystem conservation and restoration; and networking of wetland nature reserves.

4.Forest carbon monitoring and accounting: technology of forest carbon measurement and monitoring; accreditation and verification of forest carbon projects; and etc.

5.Control of disasters in forests and adaptive management: ecological and biological management of forest disaster; forest health maintenance and restoration technology; monitoring and early-alarm on forest fires and etc.

6.Forest biomass-based energy and materials: Early assessment and prediction of utilization of biomass material and resources; high performance new material of forest biomass; efficient transformation of forest biomass energy and etc.

7.Efficient utilization of forest resources: value-added wood, bamboo and rattan processing and application technology; design and fabrication technology of biomass-based composite materials and biodegradable polymer materials; recycling use of waste wood-based materials; and etc.

8.Forest-related information technology: sensor network of access to forest biological and environmental information, spectroscopic detection and analysis and video surveillance; prediction and early warning of forest resources based on growth modeling and 3S technologies and etc.

9.Urban forests.

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云南省科学技术情报研究院
YUNNAN ACADEMY OF SCIENTIFIC & TECHNICAL INFORMATION

Yunnan Academy of Scientific and Technical Information

YASTI´s major service covers the scientific and technical literature resource development, the technology transfer and international cooperation in science and technology, the climate change and CDM development service, the research for S&T policy and developing strategy, the S&T project consulting and evaluation and so on. In the decade, YASTI has endeavored in the technology transfer and international cooperation careers of new and renewable energy technology with its products to combat climate change. The worldwide

cooperation relationships have been set up with related international organizations in Southeast Asia, South Asia, United States, United Kingdom, France and Japan, such as ASEAN Secretariat, Asia-Pacific Center for Technology Transfer of United Nation (UNAPCTT), Council of Renewable Energy in Great Mekong Region (CORE), by which to push the regional activities for combating climate change and to accelerate the new and renewable energy technology transfer career. With the effect of YASTI, the China-ASEAN Scientific and Technical Forum mechanism has been built up. Targeting at the new and renewable energy, agricultural technology application and other areas, YASTI has carried out 12 activities as international scientific and technical cooperation forum, project implementation and training. Nowadays, YASTI is collaborating with APCTT of UN and ASEAN Secretariat to construct the ″International Technology Transfer Platform in New and Renewable Energy for Asian and Pacific Region″, which aims to provide supports and services as technology research, product promotion and application, regional technology transfer for developing countries in the progress of combating climate change.

1. YASTI has cooperated with Ayutthaya University to build up a Sino-Thai building integrated solar energy system demonstration base in Thailand. This construction has greatly pushed the demonstration and promotion of China´s solar energy technology with its product in Southeast Asian countries, to improve the solar energy utilizing ability and standard in the region.

2. Successfully held China-ASEAN Scientific and Technical Forum, which focuses on combating climate change by science and technology, to accelerate the promotion and application of new and renewable energy technology and its product in developing countries. Under the topics of new and renewable energy, agricultural new technology promotion and application, energy-saving technology and application, many activities have been carried out as forum, project implementation and training.

3. YASTI is collaborating with APCTT of UN and ASEAN Secretariat to construct the ″International Technology Transfer Platform in New and Renewable Energy for Asian and Pacific Region″, to enhance the promotion and application of new and renewable energy technology with its product in the region.

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