PCIEERD

Annual Report 2012

Department of Science and Technology
Philippine Council for Industry, Energy and Emerging Technology Research and Development

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PROFILE

The Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) is one of three sectoral planning councils of the Department of Science and Technology (DOST).

It is mandated to serve as the central agency in the formulation of policies, plans and programs as well as in the implementation of strategies in the industry, energy and emerging technology sectors through the following S&T programs:

- Policy Development and Advocacy
- Support for Research and Development
- Human Resource and Institution Development
- S&T Information Dissemination and Promotion
- Support for Technology Transfer and Commercialization

VISION

Collective leadership that appreciates the past, proactive in the present and working towards well-defined R&D thrust that ensures a critical mass of researchers, scientists and engineers; competitive industries; sustainable energy and the efficient & effective use of emerging technology for inclusive growth.

PRIORITY AREAS

✓ Industry
- Electronic and Semiconductor Industries
- Food Processing
- Metals and Engineering
- Mining and Minerals

✓ Energy
- Alternative Energy
- Energy Efficiency
- Transportation

✓ Emerging Technologies
- Biotechnology/ Genomics
- Information and Communications Technology
- Materials Science/Nanotechnology
- Photonics
- Space Technology Applications

✓ Special Concerns
- Climate Change Adaptation and Mitigation
- Disaster Risk Reduction and Management
- Environmental Issues

Message from

the DOST Secretary

I extend my sincere greetings to the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD).

The DOST is focused on developing specific and attainable programs that would have immediate impact on economic growth and sustainable development. In building the scientific capacity and research base in the country, our Department will continue to devote resource and policy support to enable our Councils and Institutes to create competitiveness in their sectors where research, technology and innovation can be put to good use in development efforts and improving the quality of life of the Filipino. We commend you for your hard work and dedication in trying to put in place a culture of competence and excellence in your sectors.

I am happy that one of the highlights of your annual celebrations is the release of the PCIEERD 2012 Annual Report. Your accomplishments for the past year would show that you began 2012 clear on your priorities and opportunities. The PCIEERD's research and development (R&D) agenda supports many of the priority outcomes that guide our current government and I am aware of the sterling work of this Council in response to the key result areas (KRA) identified by the Aquino Administration. With the numerous programs and projects initiated to meet the nation's challenge, you have transformed into an entity that plays a more strategic and influential role in R&D in the country.

Congratulations!

MARIO G. MONTEJO
Department of Science and Technology

Message from

the DOE Secretary

Our warmest greetings and congratulations to the Department of Science and Technology (DOST) and the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) for another year of victories and triumphs in the science and technology sector!

The year 2012 was momentous as it was astounding. Not only we have showcased breakthroughs and milestones, it was an opportunity for PCIEERD to become instrumental in developing emergent technologies in energy and industry to increasingly environmentally-aware Filipinos. We are all quite aware that energy is expended in every sector and one of the key developmental concerns across the globe; it is then prudent that we be conscious of its use.

The Department of Energy is especially thankful to DOST and PCIEERD in highlighting the need to sustainably develop the country. With the realization that the current model of development is unsustainable, there is a growing need to shift to a decarbonized economy and enable people throughout the country to satisfy their basic needs and enjoy a better quality of life, without comprising that of future generations. This is one of the most important issues that DOST through PCIEERD will tackle. On that track, we have to start making real progress toward reconciling these contradictions as we face a future that is less certain and less secure. We need to make decisive move toward a more sustainable development, with science and technology as partners, for our own long-term best interests.

We now foresee a new energy landscape that is more efficient, competitive, and vibrant than ever before as we integrate various technologies and policies to a more holistic direction. These developments will bring us even closer to a more energy-sufficient Philippines. Alongside this positive outlook, we also see major challenges up ahead. As the tight power supply situation in Visayas and Mindanao shows, we must become responsive in rethinking our short-, medium-, and long-term programs and policies. I am confident that our collaboration will continue on in the years to come.

Congratulations for a job well done!

CARLOS JERICHO L. PETILLA
Department of Energy

Message from

the DOST Undersecretary for R&D

Innovation is a key factor in global business competitiveness. Thus, countries with the capacity to innovate, particularly in applications utilizing advanced knowledge and techniques of science and technology (S&T), also mean national potential for sustained economic growth. As such, PCIEERD has continued to support innovation in research and development as well as sustained efforts in strengthening our capability for innovation in the industry, energy and emerging fields.

In 2012, PCIEERD continued to align its research programs to the five (5) priority areas of the DOST- developing solutions to the pressing problems, developing appropriate technologies to create growth in the countryside, harnessing technology to improve competitiveness, using science and technology to enhance delivery of government and social services, and harnessing emerging technologies to boost national competitiveness. Particularly, PCIEERD's roadmaps on environment, food, metals and engineering, energy, genomics and nanotechnology were created to respond to the needs of the DOST's priority areas.

Further, PCIEERD channeled its efforts and resources in human resources development as well as researches in the new knowledge fields of science and technology. The Council also pursued its goal to transform R&D outputs into opportunities for wealth and job creation by supporting technology transfer and commercialization activities.

In all these endeavors, PCIEERD enjoyed the support and cooperation of its partner institutions from the academe, government and private sector. Moreover, the teamwork provided by the PCIEERD management and staff complemented these partnerships for the successful implementation of programs and activities.

I salute PCIEERD for remaining resolute in its goal of making the industry, energy and emerging technologies linchpin of our country's economic growth and global competitiveness.

AMELIA P. GUEVARA, Ph.D.
Former Executive Director, PCIEERD
(April 1, 2011-June 30, 2012)

Message from

the DBM Undersecretary

Congratulations to the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) for another productive year of service to the nation. As a very young organization, we commend the PCIEERD family for having successfully managed the 'birth pains' and the many challenges of a growing organization as it delivers its extensive tasks and responsibilities. The collective effort and dedication of the men and women of the PCIEERD have made it possible for the Council to transform its plans to doable actions, and ultimately, to meaningful outputs and outcomes, as embodied in the 2013 PCIEERD Annual Report.

The Department of Budget and Management (DBM) is pleased to be part of the Council's journey as it strives to promote new and emerging technologies and innovations in science, industry and energy sectors. As one of the key drivers of growth, S&T research and innovation plays a major role in enhancing our country's productivity and competitiveness, and in creating much-needed jobs. It is also an integral element in the realization of the current Administration's priorities on food self-sufficiency and climate change adaptation and mitigation.

Bound by our common quest for sustainable and inclusive growth for the country, the DBM is and will always be a staunch partner of PCIEERD and other government agencies and entities who are deeply committed to building a better quality life for our countrymen.

MARIO L. RELAMPAGOS
Department of Budget and Management
Member, PCIEERD Governing Council

Message from

the DTI Undersecretary

Our warmest greetings to the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) on the publication of its 2012 Annual Report.

The Board of Investments congratulates the PCIEERD for another sterling year of harnessing the country's Science and Technology capabilities through its strong research and development program. Science and technology, considered significant drivers of economic development, are essential in enhancing the capacity of our local industries to produce goods and provide services with world-class standards.

We laud PCIEERD's efforts in boosting our capabilities through aggressive application of science and technology in development initiatives on key growth sectors. This includes the use of genomics and biotechnology in agriculture, provision of state-of-the-art testing facilities and validation services for the semiconductor and electronics industry, and the advancement of science-based responsible mining. We likewise recognize PCIEERD's work towards strengthening the disaster risk reduction efforts of the administration through its use of the Light Detection and Ranging (LIDAR) technology, detailed and updated flood hazard maps for critical systems to minimize damage to properties and the loss of lives.

We value PCIEERD's cooperation and partnership with the Department of Trade and Industry and the Board of Investments in developing the necessary interventions that will promote growth and development of Philippine industries and its dedication and determination to advance the development and application of science and technology.

Congratulations and Mabuhay!

ADRIAN S. CRISTOBAL JR.
Department of Trade and Industry
Member, PCIEERD Governing Council

Message from

the CHED Commissioner

It is with great pleasure that I congratulate the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) for the many accomplishments that it has realized in the past year as presented in your Annual Report for 2012.

In the pursuit of its mission, PCIEERD has effectively encouraged the use of technology in seeking to solve the problems of poverty, unemployment and inequality among our people. These were the same problems which have continued to plague our efforts at development in the past, and which have caused our difficulties in uplifting the standards of living and the quality of life of our people for many years.

PCIEERD has continued to be true to its calling. Its people have time and again shown exceptional commitment to the cause of helping our country. Your annual report very clearly indicates not only your numerous accomplishments but also the kinds of sacrifices that each one within your ranks undertook in the past year, and even the many years before that, to realize all of these.

As a member of your Governing Council, I am deeply grateful for the opportunity to be part of your crusade. Allow me to express my fullest admiration for your significant achievements, and my sincerest wishes for more successful years ahead of you.

Again, congratulations and more power!

RUPERTO S. SANGALANG
Commission on Higher Education
Member, PCIEERD Governing Council

Message from

the PCIEERD Executive Director

It is my pleasure to accept the challenge as the new Executive Director of the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD). I am fortunate to have a progressive scientist and a pragmatic boss, Undersecretary Amelia P. Guevara, as my predecessor.

Two years ago, PCIEERD was established with a mandate of promoting knowledge creation, technology generation and information dissemination; and pushing for the transfer and commercialization of technologies generated from DOST- and PCIEERD-funded research and development (R&D) projects and programs (PAPs). In this relatively short period of time, PCIEERD has accumulated a solid portfolio of innovative R&D PAPs that respond to national pressing problems and secures the future of the next generation of Filipinos. These projects and programs cut across different disciplines and geographic boundaries.

In 2012, acting on President Aquino's directive, PCIEERD supported large projects that established testing laboratories and research facilities for the semiconductor and electronics industry, biotechnology, nanotechnology and genomics. These are the Advanced Device and Materials Testing Laboratory (ADMATEL), Biotech Pilot Plant, Solar Cell Characterization Facility and Philippine Genome Center. These facilities provide local industries with access to affordable quality testing services and research facilities. Furthermore, PCIEERD ushered the DOST Flagship Program on Disaster Management commonly known as NOAH (Nationwide Operational Assessment of Hazards) to achieve the goal of promoting and integrating advanced science and technology to enhance disaster management and prevention capacity of the national and local government.

PCIEERD is also keeping a close eye on the S&T Program for Responsible Mining in Mindanao which is aimed at coming up with a socially-acceptable, ecologically sound, environment friendly and economically viable mining in the region, anchored on sound decision support system developed ICT and generated through R&D.

The continuous support of PCIEERD's partner institutions from the academe, government and private sector, as well as international organizations, has helped the Council successfully implemented its programs and initiatives. The unwavering professionalism, team spirit, hard work and commitment of the staff and management of PCIEERD contributed to ensuring that the goals of the Council can be realized. Thus, PCIEERD shares with you our achievements in 2012. We will continue working on well-defined R&D thrust that ensures a critical mass of researchers, scientists and engineers; competitive industries; sustainable energy; and the efficient and effective use of emerging technology for inclusive growth.

ROWENA CRISTINA L. GUEVARA, Ph.D.

FOREWORD

It has been two years since the new PCIEERD came to be and I must say the Council has hit its strides, notwithstanding snags as it moved on to accomplish its mandated functions. These challenges in the long run, contributed to strengthening and bringing out the best in the Council.

The year 2012 is indeed one for the records as the Council was abuzz with activities, monitoring 245 projects. The Council contributes to the country's economic development by supporting R&D projects that are aligned to the programs of the government on poverty alleviation, rapid and sustained growth and climate change adaptation and mitigation. The Council monitors projects of special concerns and continue to implements its programs on human resource development.

This Annual Report presents all the activities, which the Council conducted during the year. It also speaks of its partners, collaborators, and stakeholders from the private, public and academic sectors who have that common resolve to help in the nation's development, in making everyday life better and easier with the use of science and technology.

This Annual Report also comes with our acknowledgement of the great minds behind the Council, those who painstakingly assist in coming up with plans and programs and efficiently stir the Council in achieving its mandates –the PCIEERD Governing Council.

This is our report.

RAUL C. SABULARSE
Deputy Executive Director, PCIEERD

Executive Summary

In retrospect, the year 2012 signaled the convergence of players and stakeholders in the continuance of the plans and programs of PCIEERD, as well as the beginning of new and exciting activities that are all anchored to the overall thrusts of the DOST. While still in its early stages as a merged Council, much had been put together, creating a more vibrant environment of collaboration which led to meaningful contributions to the country's development goals. For one, PCIEERD welcomed its new and full-time Executive Director, Dr. Rowena Cristina L. Guevara, whose expertise and productive track of involvement in the science community provide that much-needed leadership as the Council is expected to put bigger stakes in S&T activities.

Dr. Rowena Cristina L. Guevara (center) took her oath of office as the new PCIEERD Executive Director before DOST Secretary Mario G. Montejo (second from left) on July 2, 2012. Also in photo (from left to right): DOST Undersecretary for S&T Services Prof. Fortunato T. Dela Peña, DOST Undersecretary for R&D Dr. Amelia P. Guevara and DOST Undersecretary for Regional Operations Dr. Carol M. Yorobe.

The Council advocates the ultimate goal of the DOST to make S&T work for every Filipino which redounds to a better way of doing things for a better way of life. With this in mind, PCIEERD pushes for the conduct of projects and activities that would make a difference.

In the year past, PCIEERD shepherded/monitored a total of 245 R&D projects funded under PCIEERD GIA and DOST GIA. Of these, 85 were new, 138 ongoing and 22 completed. With all these projects and other activities, PCIEERD efficiently managed a total budget of P1.6 billion. Also, the Council evaluated 251 project proposals, including those for DOST GIA funding. Needless to say, the Council was able to orchestrate its mandated functions with a dedicated manpower, collaborators and partners who have that common goal to help transform the nation through S&T.

Directing S&T Activities Towards DOST's Five Program Thrusts

The Council took on the imperative to direct its S&T activities to respond to the DOST's five (5) program thrusts: addressing pressing national concerns through S&T, developing industries for countryside development, increasing industry competitiveness, applying enabling emerging technologies, and improving delivery of government services. All these activities are with the resolve to embed S&T in every activity to which Juan can rely on for a better life. In most of its sectors, PCIEERD in consultation with its stakeholders and partners developed the sectoral roadmaps that direct and ensure the specific goals for every sector are carefully followed. Several of the projects being monitored by PCIEERD are also under the DOST's High Impact Technology Solutions (HITS).

Addressing Pressing National Concerns on Disaster Risk Reduction (DRR), Climate Change and the Environment

With significant projects as the National Operational Assessment of Hazards (NOAH) and Nationwide Disaster Risk Exposure Assessment for Mitigation (DREAM), we now don't just leave climate-related natural disasters to chance, much more the damages particularly the loss of lives and livelihood. NOAH and DREAM make weather predictability a reality and allows real-time data for everyone to readily access anytime at any place. This empowers citizens to make critical, life-saving decisions, as well as investments taking into consideration weather scenarios using "intelligent data" generated. The Automated Guideway Transit (AGT) now also demonstrates an alternative and efficient transport model, which is proudly Filipino-made and is running at the UP Diliman grounds. It smartly addresses the severe lack of environmentally sustainable technology alternatives for fast and reliable mass transport system in the country. As for the environment, continuing researches to promote green technology, use of microbial biofilms for the rehabilitation of polluted wastewater as well as the better mine for responsible mining were implemented.

Tapping Natural Resources for Countryside Development

There is so much natural resource which can be developed into products and industries and eventually help in countryside development. The Council sees this potential and ventures into tapping plant species of special purposes. The big program on sago is making headway for establishment of several industries. It is also providing technological support for the upgrading of local cacao and the cocoa industry where the design and fabrication of equipment for the production of cacao products will be done locally. Other projects include the use of nipa as natural sweetener, development of neo-ethnic textiles and tropical fabrics. Another resource that abounds in the countryside is wind energy. Small-scale wind turbines will soon rise in areas with very good wind regimes as energy source for households.

Making Industries Competitive

The Advanced Device and Materials Testing Laboratory (ADMATEL) is now serving the semiconductor and electronics manufacturing industries. It boasts of state-of-the-art equipment like focused ion beam field emission scanning electron microscope (FIB-FESEM), auger electron spectroscopy (AES), and time of flight secondary ion mass specstroscope (TOFSIM). These equipment provide the materials testing needs of the electronics manufacturing industries. Companies need not send their materials and sample products abroad for testing which also means shorter turn-around time for analysis and at lower cost. This improves competitiveness of semiconductor and electronics industries. Another offshoot of these programs is the establishment of the Philippine Electronics Product Development Hub.

The Council also looked into the mining sector. It spearheaded the S&T Program for Responsible Mining in Mindanao which focuses on value-adding of mineral-based products, development of technologies for the efficient and judicious extraction and optimum utilization of mineral resources, environment protection, mine rehabilitation and remediation, and manpower capability building. Part of these activities is to curb the negative perception that mining activities are environmentally-damaging.

DOST Undersecretary for R&D Dr. Amelia P. Guevara (center) and Dr. Rowena Cristina L. Guevara (third from left) represented the DOST in the signing of a Memorandum of Agreement with four state universities and colleges (SUCs) for the conduct of a research program that aims to ensure responsible mining in Mindanao.

Enabling Emerging Technologies

The Council put its stakes on nanotechnology, biotechnology, genomics, semiconductor and electronics, disaster risk management, space technology applications, and the enabler which is at the core of all these activities is information and communications technology (ICT).

ICT makes it possible for everyone to use numerical models to analyze and process abundant data for decision-making. Several projects are focused on disaster risk management which intensely apply ICT with the use of sensors for early warning systems for landslides, slopes and debris flow, digital elevation models and salient features for flood modelling, automated rapid reef assessment and the 3D topographical spatial mapping or LIDAR vulnerability maps. Also the SmartWire Program intends to develop energy efficient data acquisition and signal conditioning, reliable energy harvesting, and ultra-low power communication and computation circuits for the SmartWire sensor node. In health, the Philippine Genome Center (PGC) DNA Sequencing Core Facility (DSCF) that includes the medium-throughput NGS sequencer, high-throughput NSG sequencer, capillary (Sanger) sequencer, real-time PCR, and accessories and reagents located in UP-Diliman were also established.

Developing S&T Capability

PCIEERD continued to assist in building the capability of human resource in the country through its Human Resource Development Program and the Accelerated Science and Technology Human Resource Development Program (ASTHRDP). Through said program, Mr. Alexander Abad and Ms. Ann Dulay, faculty members from the De La Salle University had the opportunity to work on the SMART WIRE project at the Electrical and Electronics Engineering Institute of the University of the Philippines Diliman. Further, Mr. Hamdi Muhyuddin Barra from the Mindanao State University – Marawi City conducted his immersion at the National Institute of Physics of the University of the Philippines Diliman on the project "Physical Vapor Deposition of MAX Phase Thin-Films using the Magnetized Sheet Plasma Negative Ion Source for Advanced Decorative and Functional Applications."

Making Technologies Work

The Council has instituted several programs that will bring technologies to the public, including entrepreneurs who may be able to undertake innovations that could bring livelihood or income. The Council conducted technology assessment to determine a technology's potential for commercialization. One example is the transfer of the Concrete Paving Block Technology, a PCIEERD-assisted project to DUNARE International Inc. and Earth Management and Recycling Technologies, Inc.

Also, the Council recognizes that entrepreneurship and market-driven solutions are effective tools for economic growth and poverty alleviation. Thus, the Council supported Technology Business Incubation (TBI) which is recognized as an effective mechanism to nurture business start-ups in techno-enterprise and hasten commercialization of innovations. It also continued to assist the DOST's Small Enterprise Technology Upgrading Program (SETUP) assists SMEs in adopting technological innovations to improve their operations and thus boost their productivity and competitiveness. The PCIEERD also ensures that technologies are stamped with patents or utility model registrations by endorsing to the DOST's Technology Application Institute (TAPI).

Upgrading R&D Facilities

The PCIEERD has consistently supported the Regional S&T Laboratories (RSTLs) in leveling their capabilities to international standards in terms of delivery and quality of services particularly compliance to food safety and quality, increase in income and productivity, access to new markets, creation of employment, development of new products, and improved compliance to regulations. This is through the project "Strengthening the Testing and Analytical Capabilities of the Regional Laboratories to Support the Competitiveness of Local Industries (STARLABS). The RSTLs are becoming to be the laboratory of choice of local industries such as construction, manufacturing, accommodation and food services, sewerage as well as other service activities."

High-Impact Technology Solutions


INDUSTRIAL TECHNOLOGY
DEVELOPMENT INSTITUTE
(ITDI-DOST)
ADVANCED
DEVICE
AND
MATERIALS
TESTING
LABORATORY
"Our business is industry..."
http://itdibiz.com

With its ultimate goal of making S&T work in every aspect of everyday life, the DOST came up with its High Impact Technology Solutions (HITS) Program in 2011, further affirming its chosen tagline *"Nasa siyensya ang pag-asa"*.

The HITS Program strikes on immediate technology solutions that have long term impacts in alleviating mass poverty, strengthening industry competitiveness, and on the overall, contributing to national development through science and technology.

The PCIEERD continues to play a major role in hitting the goals of the program since it started in 2011 because its sectoral areas are considered the major drivers of the nation's economic development, aside from the presence of technical expertise, both internal and those of its external partners who shepherd the projects.

The Advanced Device and Materials Testing Laboratory (ADMATEL)

The ADMATEL opened its doors in November 2012 to service the semiconductor and electronic industries for failure analysis and characterization of materials and devices. This DOST national facility located at the DOST's Industrial Technology Development Institute (ITDI), is equipped with sophisticated and advanced analytical instruments and equipment like TOFSIM (Time-of-Flight Secondary Ion Mass Spectrometry), among others. With this in place, companies can now have their materials and sample products tested here instead of sending them abroad for testing. This ensures shorter turn-around time for analysis and at lower cost. It is also expected to attract potential investors seeking for a more conducive business environment.

In the long term, the ADMATEL enhances the global competitiveness of the semiconductor and other related industries in the country.

The Philippine Genome Center (PGC)

The PCIEERD also put its stake and venture in building capability for R&D in genomics. With this interest, the Philippine Genome Center that houses both the DNA Sequencing Core Facility (DSCF) and the Core Facility for Bioinformatics (CFB) located at the National Institute of Molecular Biology and Biotechnology, University of the Philippines in Diliman, are now operational. To support the core facility operations, equipment such as medium-throughput NGS (Next Generation Sequencing) sequencer, high-throughput NGS sequencer, capillary (Sanger) sequencer, real-time Polymerase Chain Reaction (PCR), and accessories and reagents for these machines were purchased.

The PGC serves as a research and service infrastructure for DNA sequencing activities in the country for discovery and functional analysis of genes of biological and biomedical importance, development of innovative therapeutic strategies and technologies as well as competent human resource in genomics and bioinformatics to drive innovations in biotechnology.

The All Filipino-Made Automated Guideway Transport (AGT) System

It has been reported that traffic congestion in Metro Manila alone costs $12 billion per year with 4 million registered vehicles in thePhilippines. The DOST has come up with smart solutions that would impact on this critical issue that has affected Metro Manila and other key cities for a while now.

The AGT introduces an alternative and efficient transport model for fast and reliable mass transport system in the country which is 1/5 lower than the cost of the Light Railway Transit (LRT). The monorail smartly addresses the severe lack of environmentally sustainable transport system for greenhouse gas (GHG) reduction which is suitable for Philippine conditions. More than these, it is proudly Filipino-made and is now running at the UP-Diliman grounds for demonstration purposes.

Nationwide Disaster Risk, Exposure and Assessment for Mitigation (DREAM) Program

Aerial Photo draped over LIDAR DSM

With DREAM, climate-related natural disasters will no longer be left to chance because real-time weather data is made accessible to everyone anytime at any place. This empowers citizens to make critical, life-saving decisions, as well as investments taking into consideration weather scenarios using "intelligent data" generated.

High resolution 3D topographical mapping and flood inundation models for 18 major river systems will be developed to provide accurate weather information and to improve response to disasters. The LIDAR maps allows better land use planning, monitor and pinpoint vulnerable spots to floods and natural disasters, as well as safe evacuation areas. Baseline data can now be overlaid with early warning systems, rainfall intensity maps, water levels of our rivers and maps of landslide-prone areas. The GIS topographic mapping done covers 1/3 of the country, while flood maps and early warning system were done for 48 provinces, 612 municipalities and roughly 37 million residents.

Slope Monitoring Systems Using Locally Developed Sensors

Aiding the monitoring systems are the locally developed cost-effective landslide monitoring system. The electronic borehole sensors are deployed deep in the ground to detect movement and soil moisture and these were installed in 4 of 11 sites in Benguet and Southern Leyte.

Doppler Radar Upgrading Program

Doppler weather radar network will be established to improve weather forecasting and warning system, particularly rainfall intensity projection and real-time typhoon tracking. The Doppler radar systems are meant to benefit the transportation (land, aviation and marine), communication, agriculture and fisheries sectors, as well as decision makers and community planners among others. There are now 9 Doppler weather radars in operation in Baguio, Baler, Subic, Hinatuan, Tagaytay, Mactan, Tampakan, Catanduanes and Aparri covering 65% of the country's land area. In the pipeline are 5 Doppler radars to cover the entire country.

Hybrid Automated Weather Station (AWS) and Rain Gauges (ARG)

It is now a well-known fact that the country is visited by typhoons 23 times a year. For Juan to be able to make critical, life-saving decisions, locally developed weather monitoring equipment of lower cost than imported are now available. There are 400 Water Level Monitoring Sensors (WLMS) and 600 Automated Rain Gauges (ARG) to be deployed throughout the country. Also, 77 AWS and 63 ARG are currently installed in river basins in Agno, Pampanga, Bicol, Cagayan de Oro, Iligan and Marikina.

Development of an English Language Training Software for Call Centers

The Philippines remains to be the country of choice for the recruitment of workers for what has become as the call center industry. The new industry has significantly increased contribution to the country's GDP from 6-8% since 2010. The reason for this is fluency of Filipinos in the English language compared to its Asian counterparts.

To improve the intake rate of hirees in call centers (7% existing), the project which is under the Inter-disciplinary Signal Processing for Pinoys (ISIP) program, provides a stand alone software for proficiency in English language. It includes an advanced English Proficiency Training for teachers and a two 100-hour training program software developed by linguists, English and speech specialists. The Speech Recognition Engine (SRE) software includes voice recording, playback and English language exercises and this will be field tested at volunteer call centers using the BPAP National Competency test – English Proficiency portion. The Department of Computer Science of the University of the Philippines in Diliman is on top of the project.

An Alternative Technology for Processing Nickel Minerals

The Council is monitoring the project that will come up with a detailed understanding of nickel laterite ores reduction by methane containing gas, and to assess the feasibility of a new, more energy-efficient technology for the processing of laterite ores. The alternative technology that will be developed will allow the Ni minerals to have more value added.

The project responds to the world nickel demand which is increasing at a rate greater than 4% annualy mainly due to expansion of stainless steel capacity. China currently accounts for about 70 % of the increase in nickel demand but records show that Philippine deposits of laterite ores are among the largest in the world.

A Filipino-Crafted Wind Power Generator System

In a previous project, the Council gave technical assistance to the wind-mapping project of the US which resulted to the determination of areas in the Philippines with the best wind regime. One of the results of the project is now the windmills in Pagudpud, Ilocos Norte which provide electricity to a community in Ilocos.

In a new project being monitored by the Council, the DOST is embarking on another project that will showcase the Filipino ingenuity, just like in the Automated GuideWay Transit (AGT) project. This time, the first Filipino-crafted wind generator system with all parts and components will be developed locally to operate under local prevailing conditions of wind speed, temperature and other environmental parameters. The capability of locally developing a wind generator system will redound to benefitting not only the power industry but also the electronics industry, including the electric cooperatives and the generator manufacturing industry.

Brown Rice for Everyone

Brown rice is more nutritious than white rice but it goes rancid more quickly because the germ—which is removed to make white rice—contains fats that can spoil the grain. It was associated with poverty and wartime rice shortages years ago and rarely eaten except for the sick, elderly and as a cure for constipation. Now, brown rice is becoming popular with its nutritional value, though more expensive partly due to low supply and difficulty of storage and transport.

The DOST is currently pursuing an R&D Program for Brown Rice to identify the factors affecting the stability of brown rice; evaluate the combined effects of different variables on the shelf life and quality; determine the optimum processing parameters; and determine the retention of nutrients, microbiological safety, texture and general acceptability of brown rice after processing and during storage. Part of the program is the development of alternative drying process for the production of stabilized brown rice for commercialization. With its nutritional value, the development of potential functional food products and recipes will also be conducted.

Harvester for Water Hyacinth Management in Waterways and River Systems

Water hyacinth thrives and multiplies so fast that it can choke waterways and river systems. This has happened in the country and to mitigate this, the DOST developed a harvester to collect free-floating water hyacinth by cutting them onsite and conveying them to the platform bed. And since water hyacinth can grow as tall as 1 meter above the surface, thus making it difficult to manually collect them, the harvester addresses this need for the mechanical removal of water hyacinth on inland bodies of water and river systems in the country.

Nanostructured Solar Energy Devices for Better Efficiency

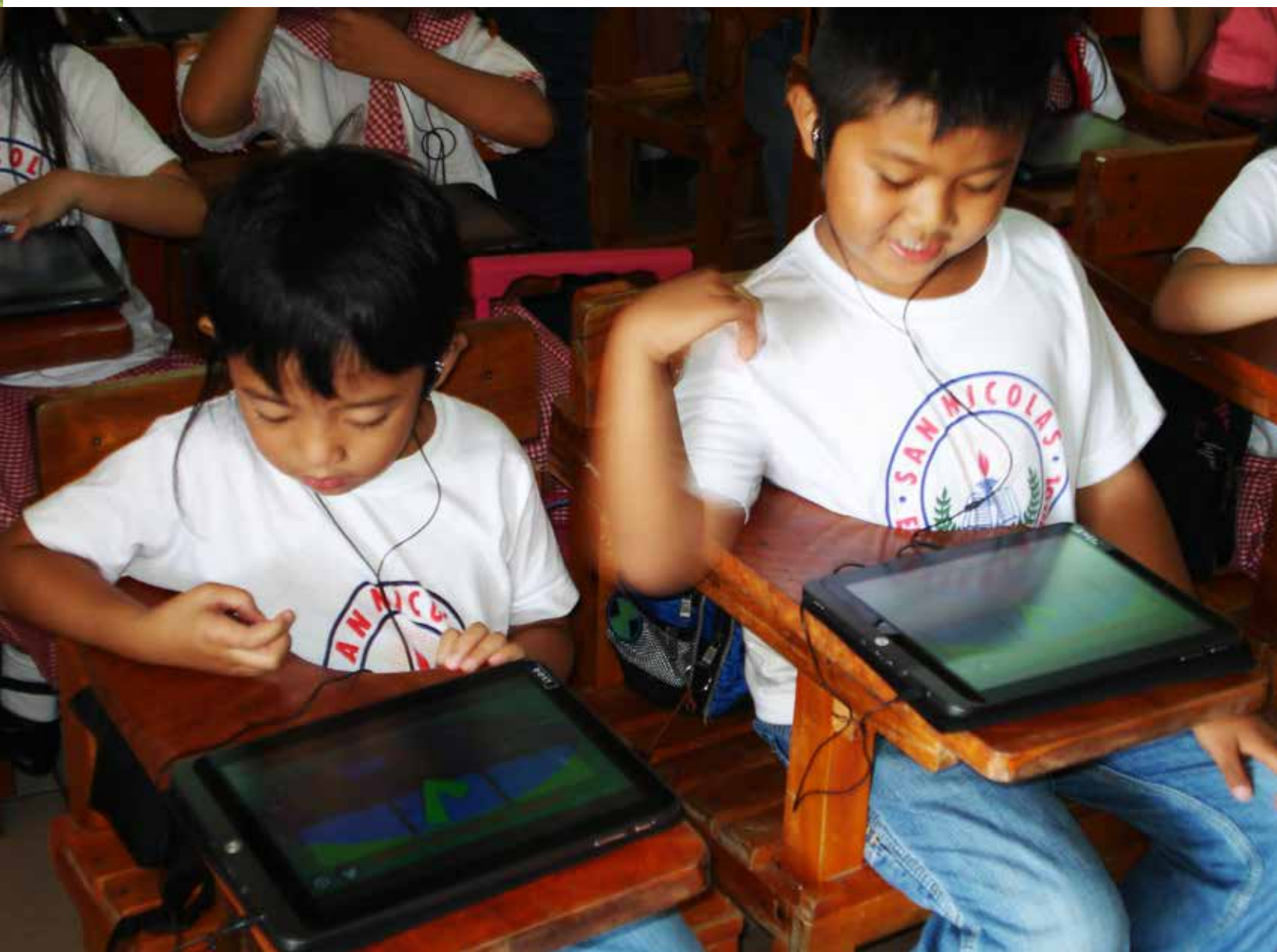
The use of nanosized materials in solar energy devices to improve the efficiency of solar cells is pursued in the program. In focusing on solid state-based and dye sensitized cells which are low-cost and environment friendly alternative energy sources.

Five specific projects are being pursued for the fabrication and incorporation of nano materials and these are:

Project 1: Nanostructures for Solar Cell Applications,
Project 2: Transparent Electrodes for Solar Cell Applications
Project 3: GaAs-based Solar Cell Devices
Project 4: Modification of Graphene for Nanostructured Photovoltaic Cell
Project 5: Solar Cell Characterization Facility

DOST Tablet Computers as Alternative to Textbooks

Aside from the automated guideway transit and wind turbine power generator system which are both all Filipino-made, the DOST is also testing its tablet computers in selected schools in the country, as an alternative to textbooks. This learning tool has 10 lessons which will be validated whether they are appropriate for basic education. Teachers and staff will be trained to use the tablet computers. An added activity of the project is the updating of the Wikipedia for Schools which will reflect current Philippine-related entries.



S&T Policy and Program Formulation

In 2012, the PCIEERD worked hard at pushing for enhanced science and technology (S&T) policy and program development in its sectors to back up research, technology and innovation in priority areas.

The Council embarked on a comprehensive review and evaluation of its work program, and orchestrated a string of consultations, focus group discussions, and stakeholders meetings in order to upgrade its existing Plans and Programs, update its Sectoral Roadmaps and cull a more relevant and responsive PCIEERD National Research and Development (R&D) Agenda. All stakeholders from private industry, academe, government and non-government entities were invited to these deliberations.

Relative to the above-mentioned review efforts were the Action Plans that were previously laid out during the 2012 PCIEERD Planning Workshop which assessed the performance of the Council per its area thrusts vis-à-vis its targets for the year, and determined the directions for CY 2013 and beyond in terms of targets in its delineated sectors. The main outputs of this workshop were the action plans that identified specific activities and targets, allocation of resources and strategies on Policy Formulation, R&D Program Management, Human Resource Development, and Technology Commercialization and Diffusion.

Likewise, several policy issues and instruments were evaluated. Among them were policies that have significant impact particularly in the Council's implementation of R&D projects, such as the refinements for proposal submission and approval of projects funded through the DOST-GIA, and the Council's input to the drafting of the Implementing Rules and Regulation of the Technology Transfer Act. The Council also evaluated proposed Philippine agreements with foreign countries regarding economic, trade and technical cooperation in S&T and related fields in the country.

Call for Proposals

The Council launched its First Call for Proposals in September last year. With the framework and the internal and external policies and guidelines in place, the issuance of the Call has greatly simplified and streamlined the application process for funding of science and technology programs and projects. Research proponents and the rest of the scientific community can now readily gain access to information about the DOST Major Program Thrusts and the PCIEERD Thematic Areas of Interest in relation to Funding Opportunities in the Council. In addition, the call provides details on award information, eligibility clauses, cost sharing and matching, threshold criteria, proposal submission information, evaluation criteria, and award administration.

The PCIEERD R&D Agenda Updating Plans and Programs

The year 2012 ushered the drafting of a revitalized PCIEERD R&D Agenda. The PCIEERD R&D Agenda considered Food, Energy, Emerging Technology, and special concerns and S&T programs related to Environment, Climate Change and Disaster Risk Reduction and Management (DRRM), including significant programs on Responsible Mining, Process and Metals and Engineering. The R&D agenda shall be integrating the formulation and recommendation of policies and/or regulations as required in every priority area.

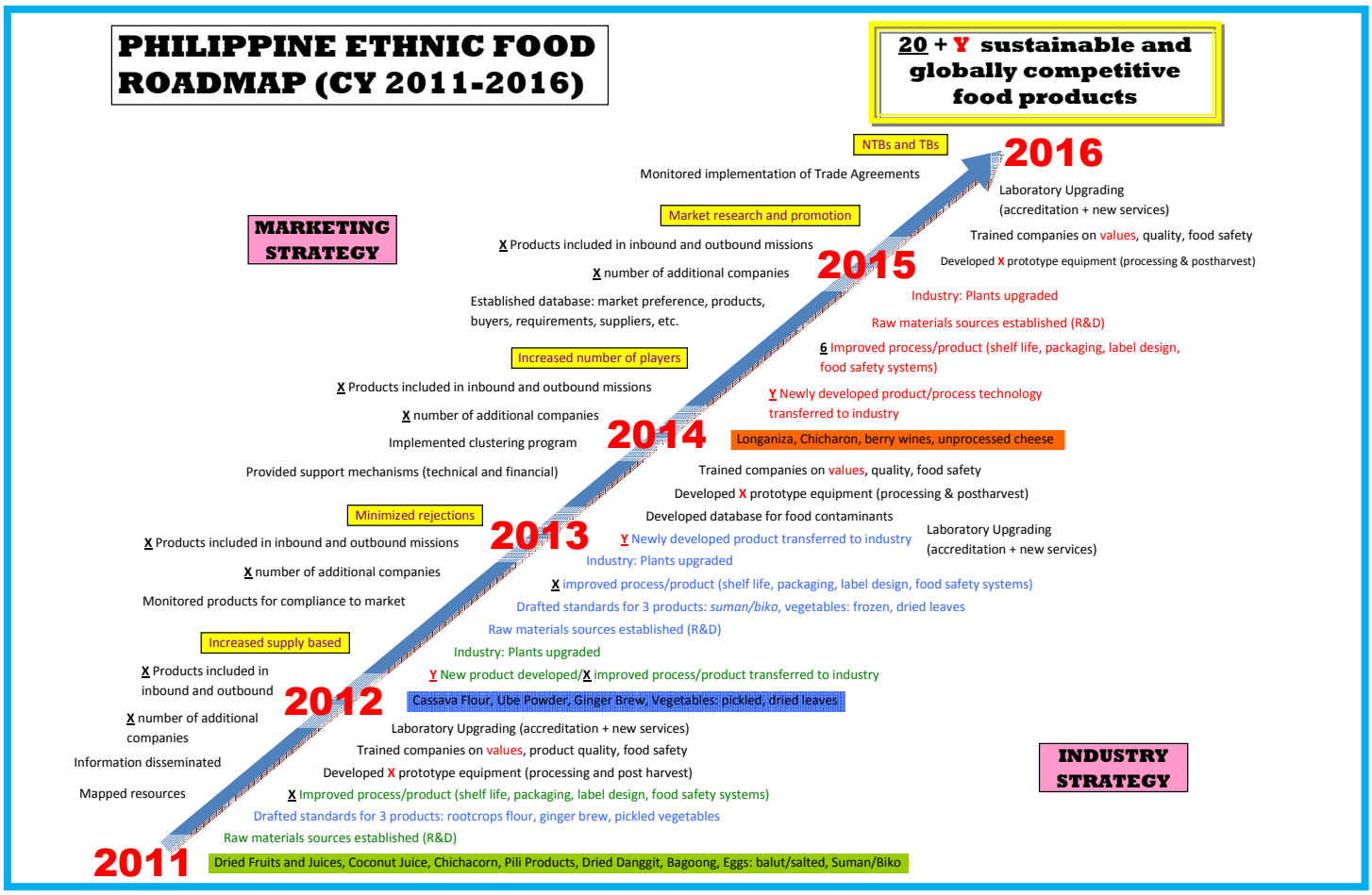
The PCIEERD R&D Agenda, expected to be completed by early 2013, provides the backbone of DOST's priority programs on (1) utilization of S&T to solve pressing national problems; (2) developing appropriate technologies to create growth in the countryside; (3) improving industry competitiveness; (4) use of S&T to enhance government and social services; and (5) enhancing capacity in emerging technologies. The R&D thrusts were reviewed in line with the DOST's renewed call for the science community to play a more strategic role in addressing pressing national concerns for social and economic growth.

Updating Roadmaps

Last year, the Council revisited its technology roadmaps in line with the effort in setting directions and identifying S&T strategies and interventions for identified sectors.The roadmaps were continuously reviewed, updated and formulated in collaboration with experts, technology users, and other stakeholder groups of the Council. A view or vision of the future and portraying a larger context for technology development or usage, the roadmaps point to short-term and long-term goals and identify specific technology developments, interventions and solutions within the sectors.

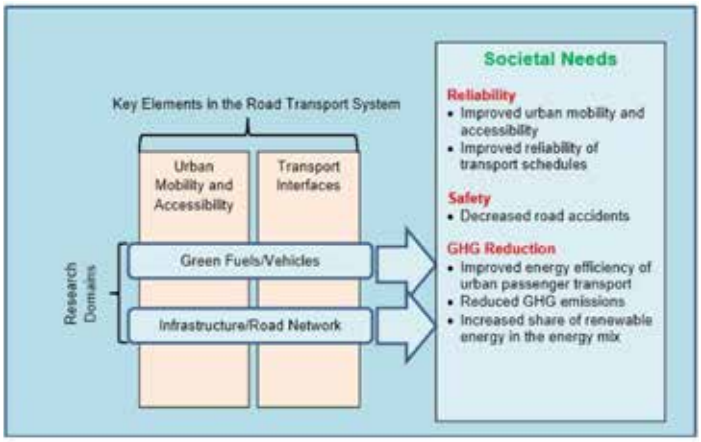
Philippine Ethnic Food Roadmap

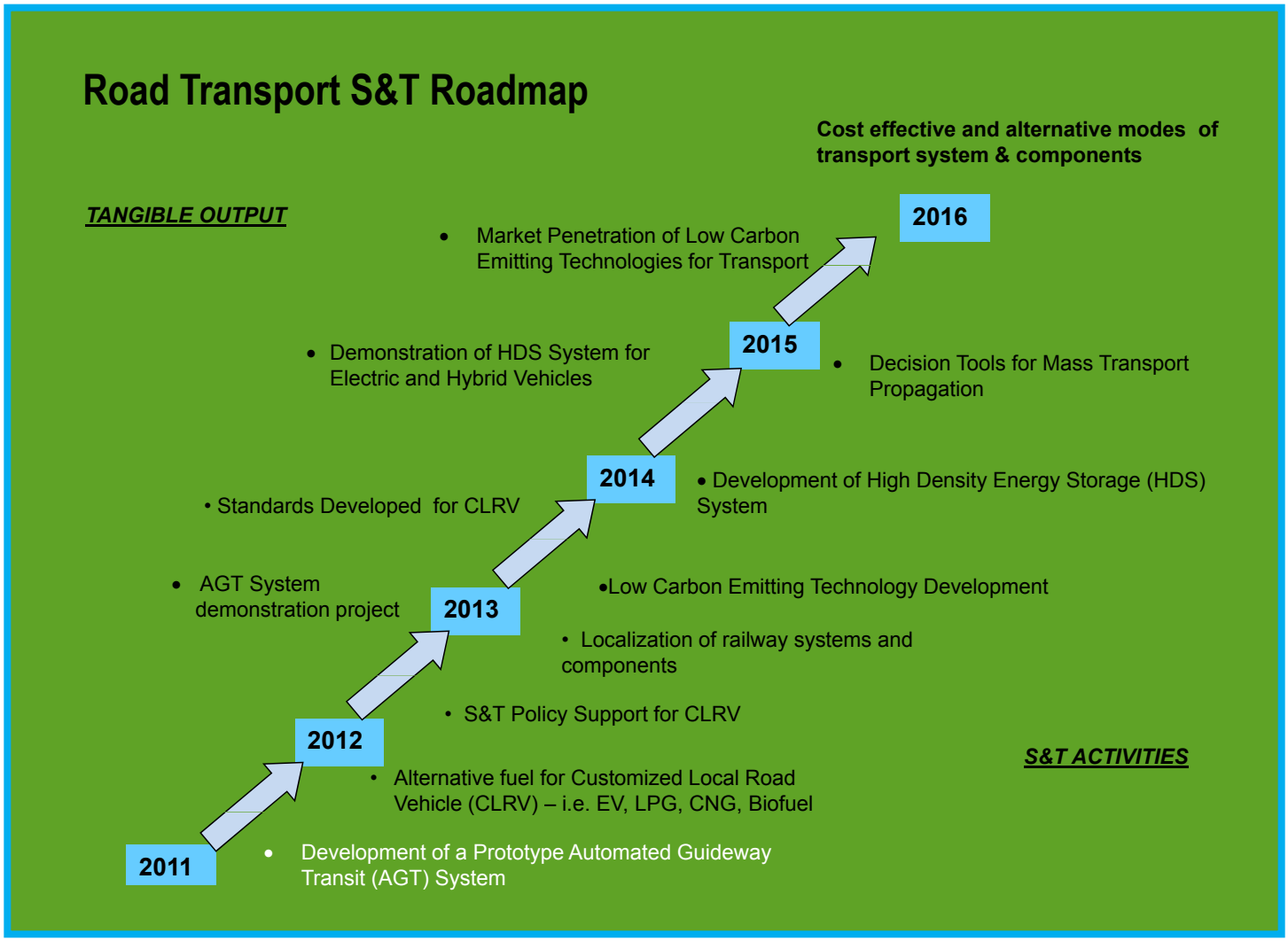
The roadmap outlines the programs that are expected to introduce innovative and improved products from locally produced raw and intermediate materials as alternative to imported materials. Efforts will lead to improved compliance of food products to global requirements (quality, safety, packaging, Halal). Considering that majority of the medium and small scale industries (MSMEs) nationwide are on processing of food (estimated to be about 12,000 by the Food and Drug Administration), technological interventions to the food industry have been put under the DOST banner program for countryside development and inclusive growth which is aligned with Pres. Aquino's objective of developing a rapid, inclusive, and sustained economic growth for the country. These outputs hope to bring about growth in food industry, especially in the countryside. It is expected to make products' quality and cost competitive and enable MSMEs to enter new markets.



Land Transport S&T Roadmap

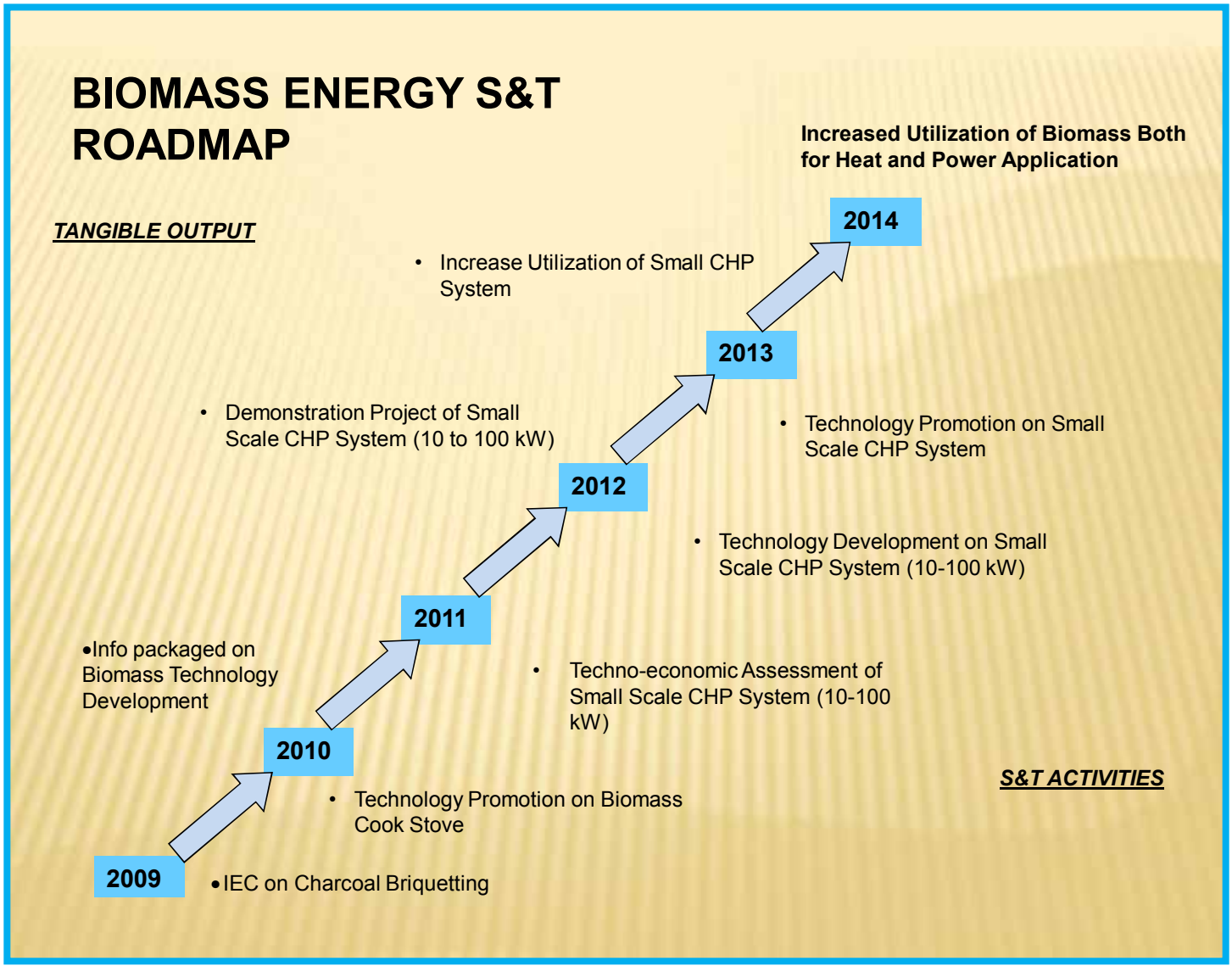
The Land Transport S&T Roadmap aims to establish a common vision and better align S&T activities with strategic objectives to optimize government resources while addressing national issues and concerns of the land transport sector. The roadmap aims to improve the energy efficiency of road transport while addressing climate change. It anticipates future demands for better transport energy efficiency, vehicle emissions and fuel flexibility through: development and increased use of green fuels/ vehicles; improvement of road and traffic management system; development of inter-modal transport system; and development of safety standards.

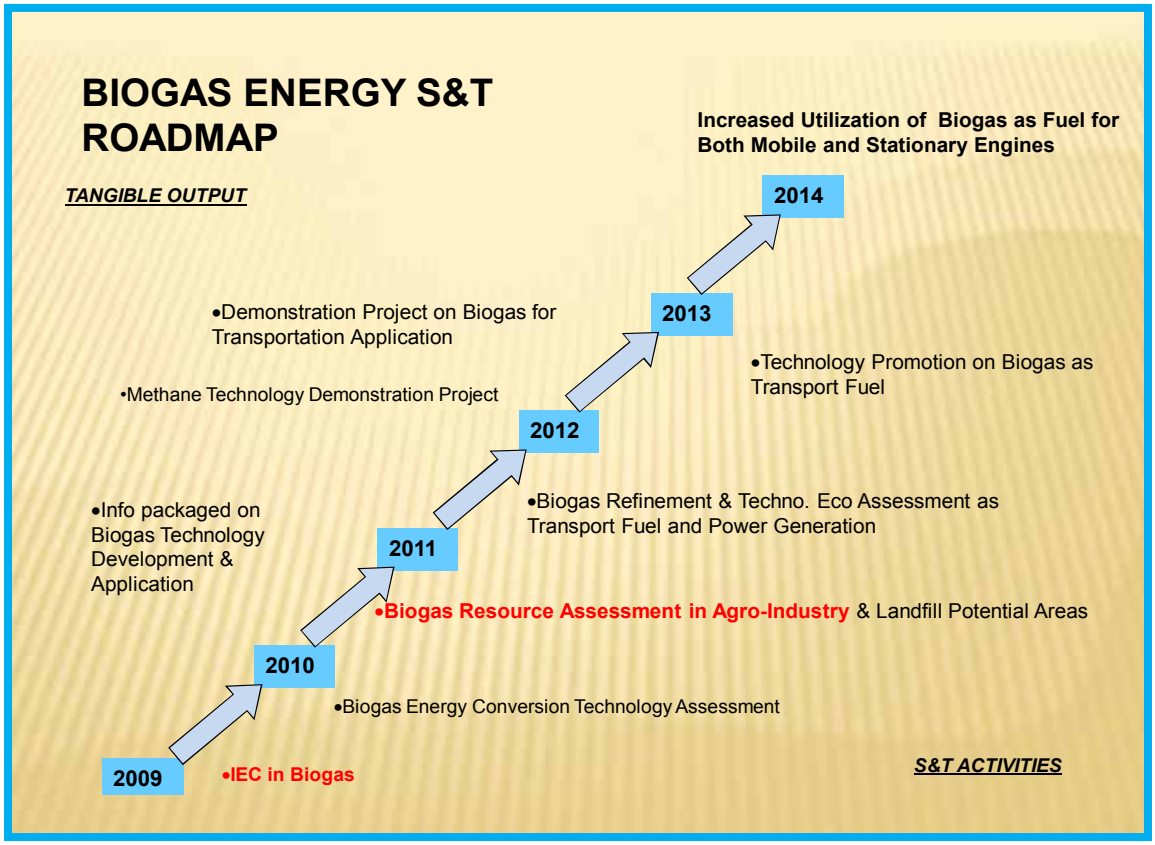


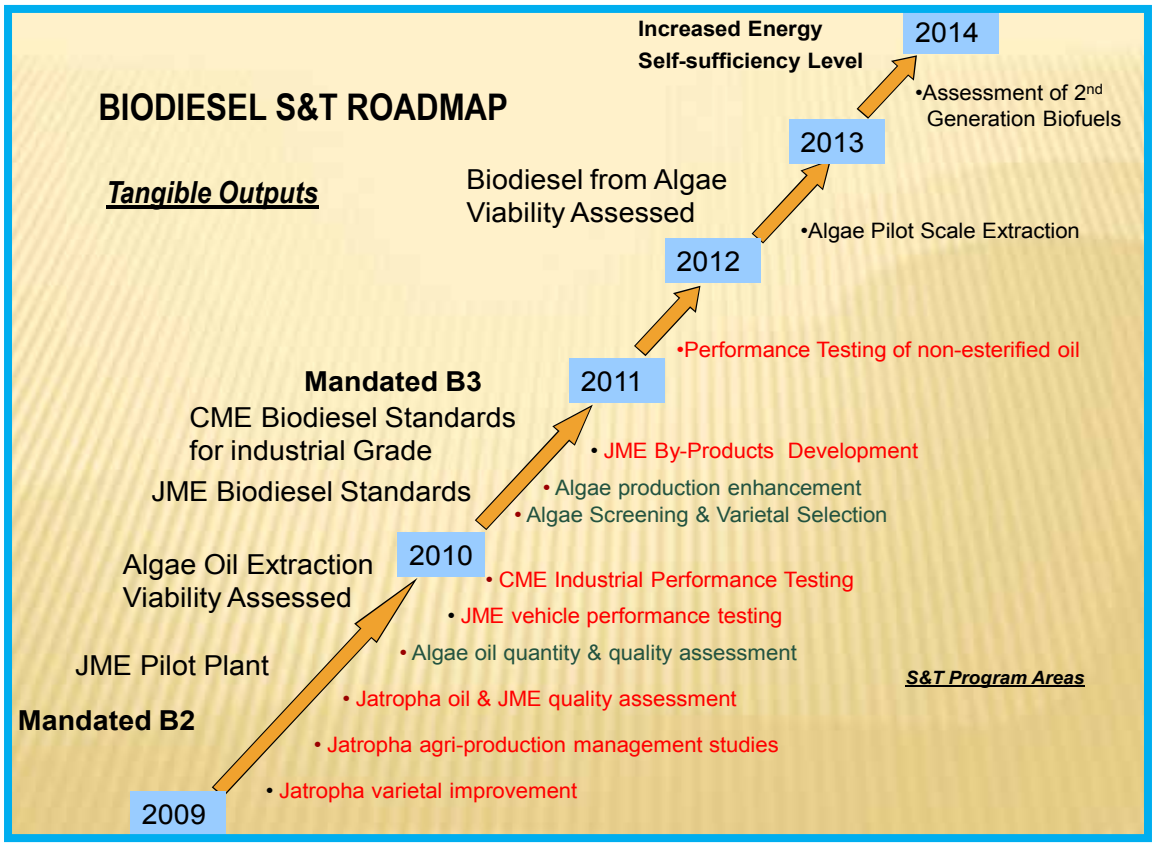


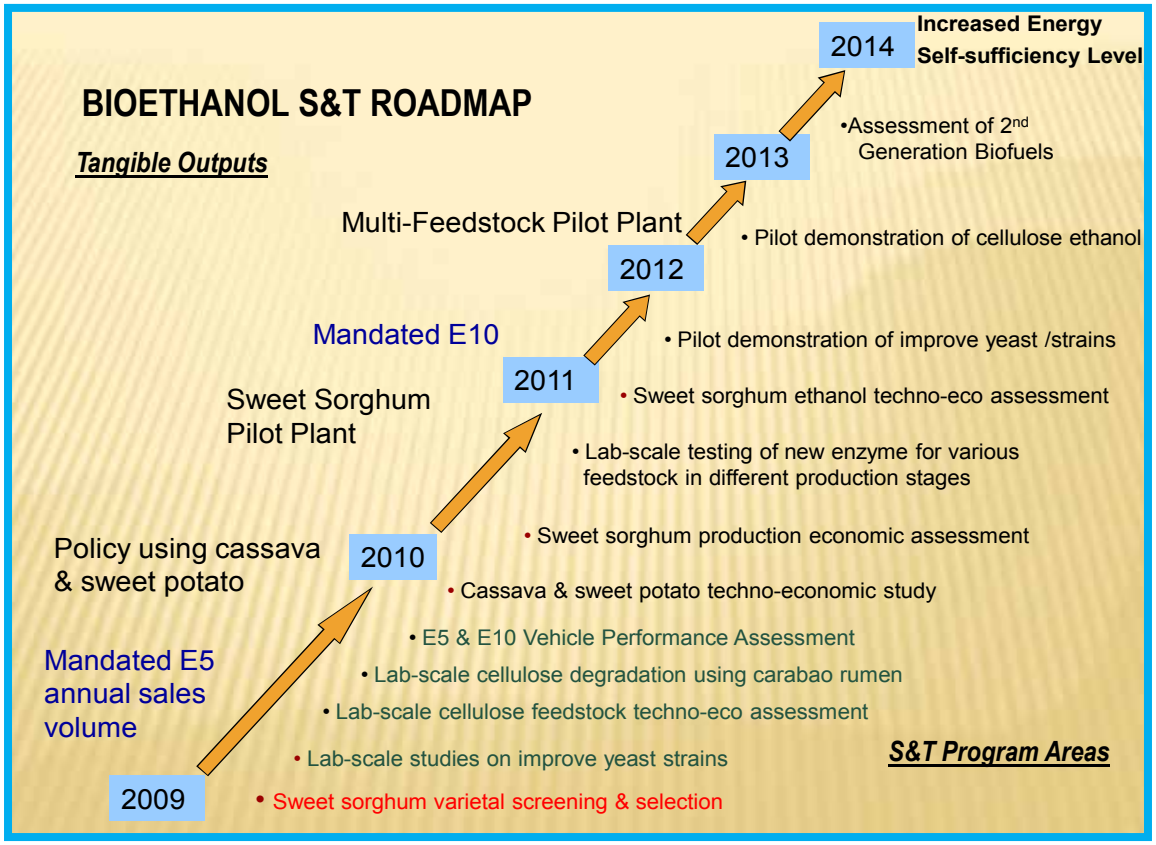
Energy S&T Roadmap

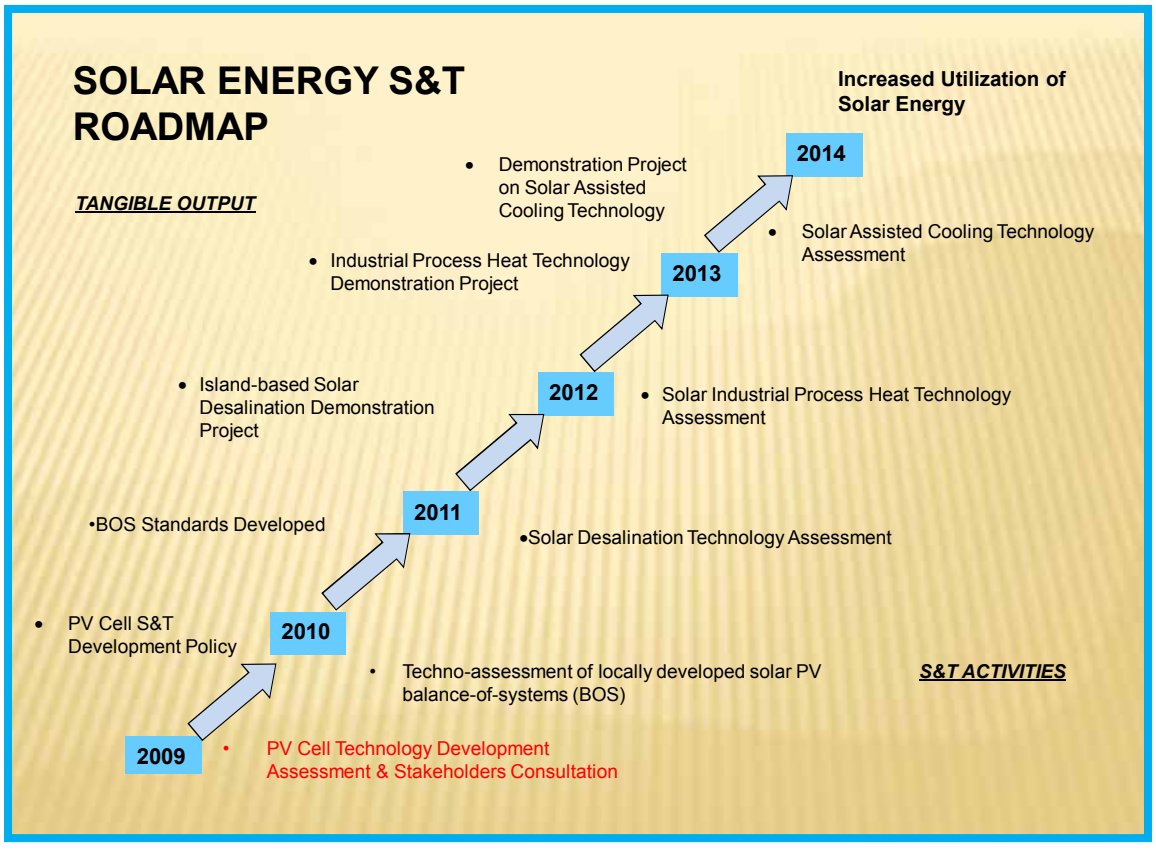
The programs on renewable energy and energy efficiency are in support of the initiatives to enhance energy self-sufficiency level that will develop and maximize the use of indigenous alternative energy resources. Covering biomass, solar, micro-hydro, ocean, wind, low-enthalpy geothermal, and energy efficiency, the energy programs include S&T infrastructure and capabilities, capacity building and S&T activities to fully harness the indigenous energy resource potential of the country. Preservation of environment and fast depletion of known primary energy sources are reasons why renewable energy development and energy conservation are significantly being pushed by the government.

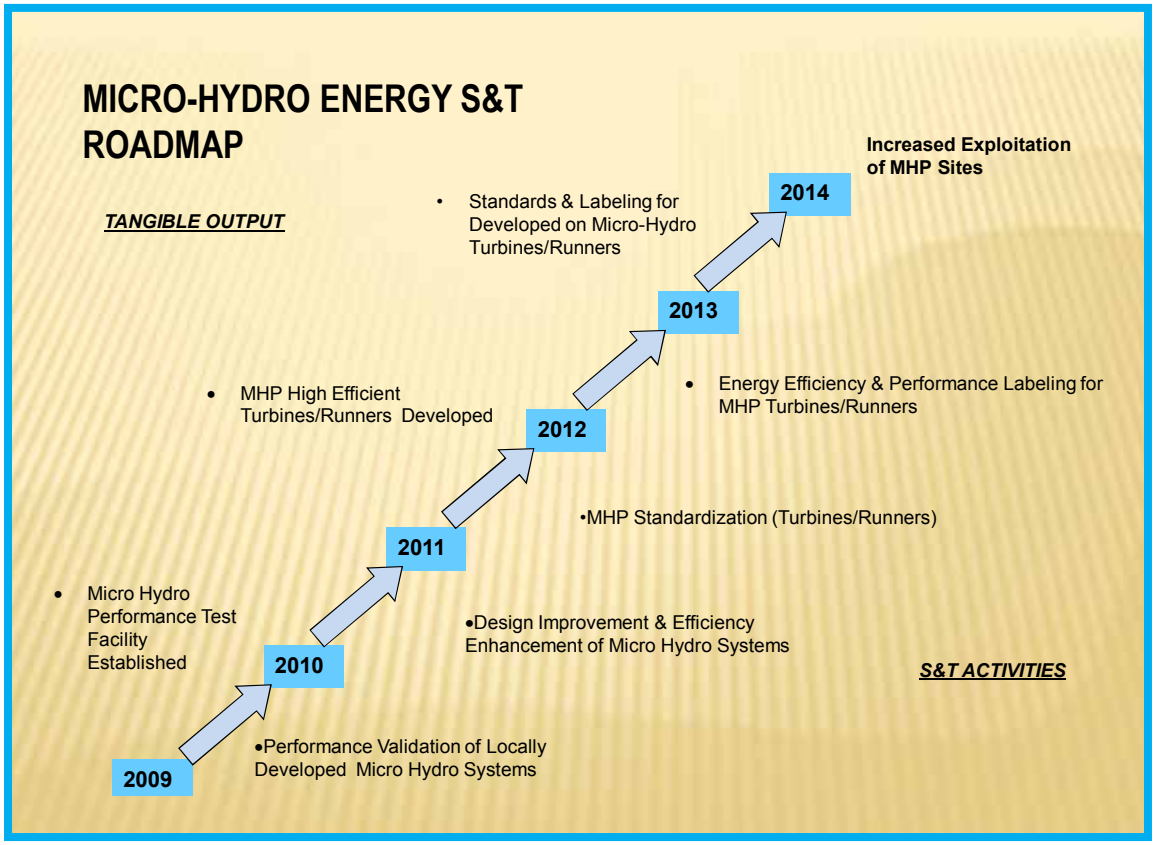


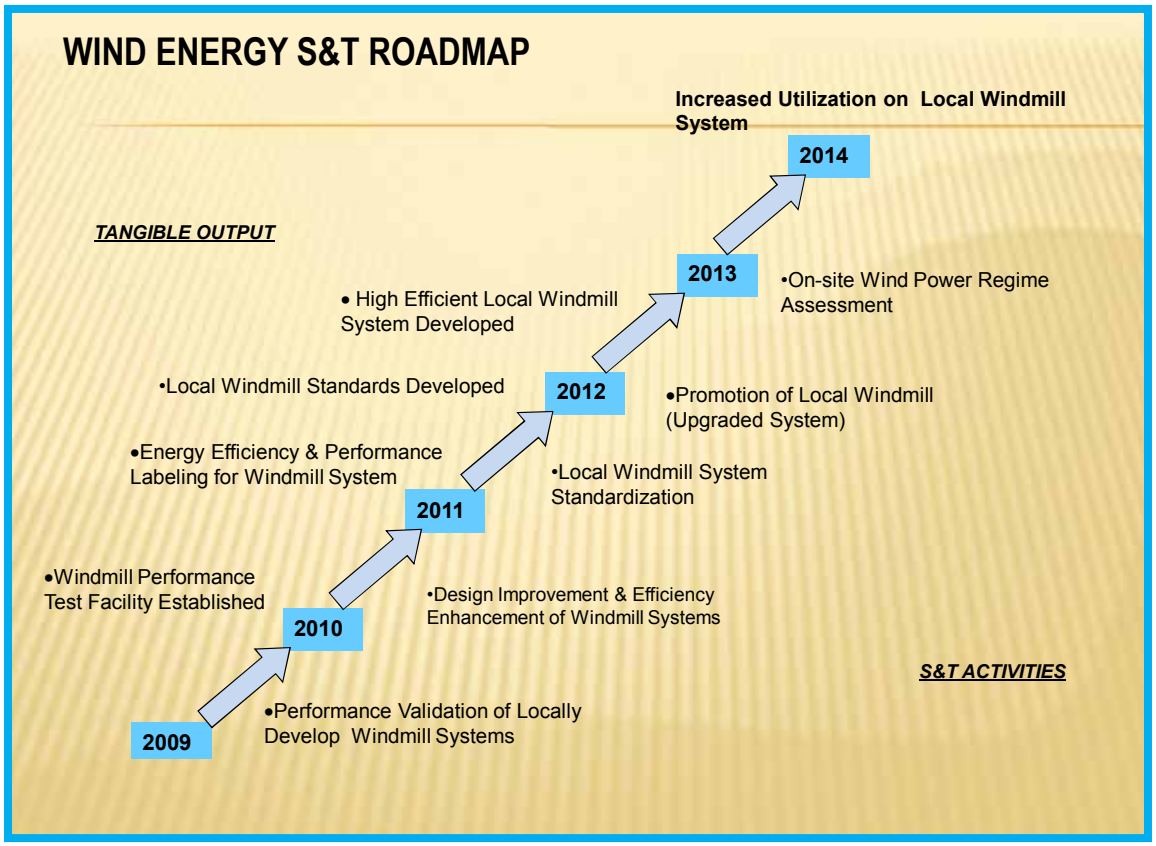

BIOGAS ENERGY S&T ROADMAP
TANGIBLE OUTPUT
Increased Utilization of Biogas as Fuel for Both Mobile and Stationary Engines
2014
2013
2012
2011
2010
2009
•Demonstration Project on Biogas for Transportation Application
•Technology Promotion on Biogas as Transport Fuel
•Methane Technology Demonstration Project
•Info packaged on Biogas Technology Development & Application
•Biogas Refinement & Techno. Eco Assessment as Transport Fuel and Power Generation
•Biogas Resource Assessment in Agro-Industry & Landfill Potential Areas
•Biogas Energy Conversion Technology Assessment
•IEC in Biogas
S&T ACTIVITIES

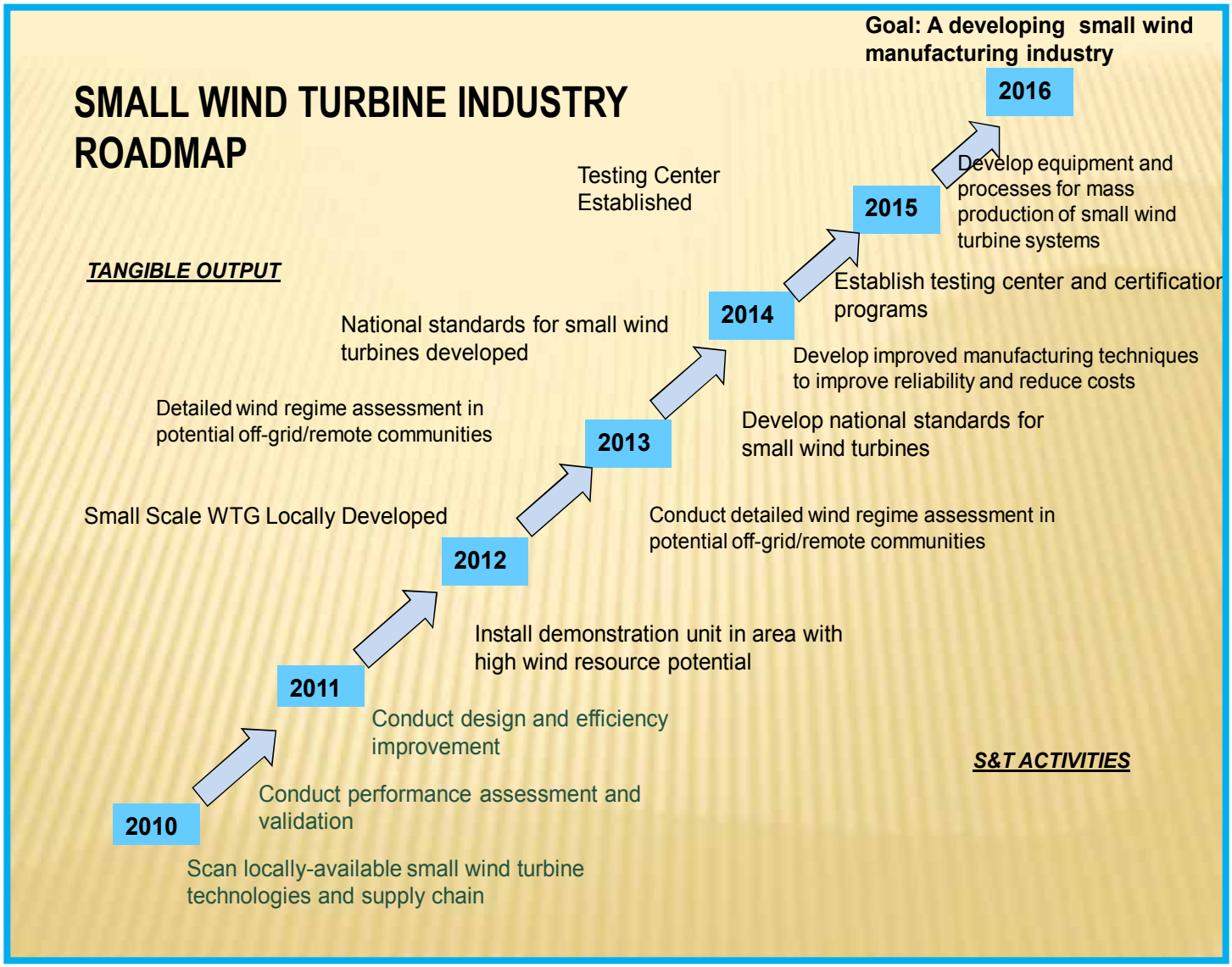

BIODIESEL S&T ROADMAP
Tangible Outputs
Increased Energy Self-sufficiency Level
2014
2013
2012
2011
2010
2009
•Assessment of 2nd Generation Biofuels
Biodiesel from Algae Viability Assessed
•Algae Pilot Scale Extraction
•Performance Testing of non-esterified oil
Mandated B3
CME Biodiesel Standards for industrial Grade
JME Biodiesel Standards
• JME By-Products Development
• Algae production enhancement
• Algae Screening & Varietal Selection
Algae Oil Extraction Viability Assessed
• CME Industrial Performance Testing
• JME vehicle performance testing
• Algae oil quantity & quality assessment
JME Pilot Plant
Mandated B2
• Jatropha oil & JME quality assessment
• Jatropha agri-production management studies
• Jatropha varietal improvement
S&T Program Areas


BIOETHANOL S&T ROADMAP
Tangible Outputs
2014
Increased Energy Self-sufficiency Level
2013
•Assessment of 2nd Generation Biofuels
Multi-Feedstock Pilot Plant
• Pilot demonstration of cellulose ethanol
2012
Mandated E10
• Pilot demonstration of improve yeast /strains
2011
Sweet Sorghum Pilot Plant
• Sweet sorghum ethanol techno-eco assessment
• Lab-scale testing of new enzyme for various feedstock in different production stages
Policy using cassava & sweet potato
2010
• Sweet sorghum production economic assessment
• Cassava & sweet potato techno-economic study
• E5 & E10 Vehicle Performance Assessment
Mandated E5 annual sales volume
• Lab-scale cellulose degradation using carabao rumen
• Lab-scale cellulose feedstock techno-eco assessment
• Lab-scale studies on improve yeast strains
S&T Program Areas
2009
• Sweet sorghum varietal screening & selection


SOLAR ENERGY S&T ROADMAP
Increased Utilization of Solar Energy
TANGIBLE OUTPUT
2014
• Demonstration Project on Solar Assisted Cooling Technology
• Solar Assisted Cooling Technology Assessment
2013
• Industrial Process Heat Technology Demonstration Project
2012
• Island-based Solar Desalination Demonstration Project
• Solar Industrial Process Heat Technology Assessment
2011
•BOS Standards Developed
•Solar Desalination Technology Assessment
• PV Cell S&T Development Policy
2010
• Techno-assessment of locally developed solar PV balance-of-systems (BOS)
S&T ACTIVITIES
2009
• PV Cell Technology Development Assessment & Stakeholders Consultation

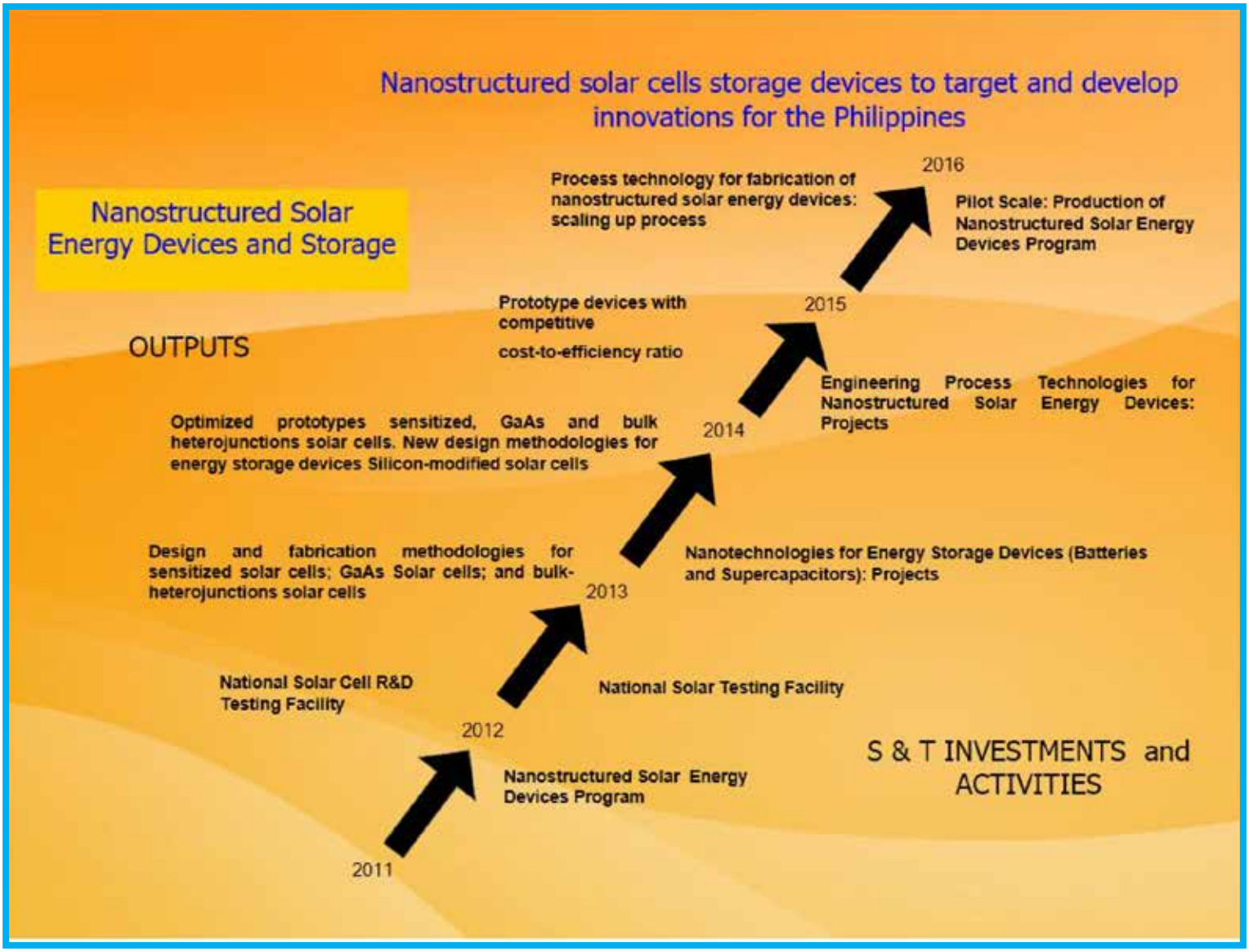

MICRO-HYDRO ENERGY S&T ROADMAP
Increased Exploitation of MHP Sites
TANGIBLE OUTPUT
• Standards & Labeling for Developed on Micro-Hydro Turbines/Runners
2014
2013
• Energy Efficiency & Performance Labeling for MHP Turbines/Runners
• MHP High Efficient Turbines/Runners Developed
2012
•MHP Standardization (Turbines/Runners)
2011
• Micro Hydro Performance Test Facility Established
•Design Improvement & Efficiency Enhancement of Micro Hydro Systems
2010
S&T ACTIVITIES
•Performance Validation of Locally Developed Micro Hydro Systems
2009

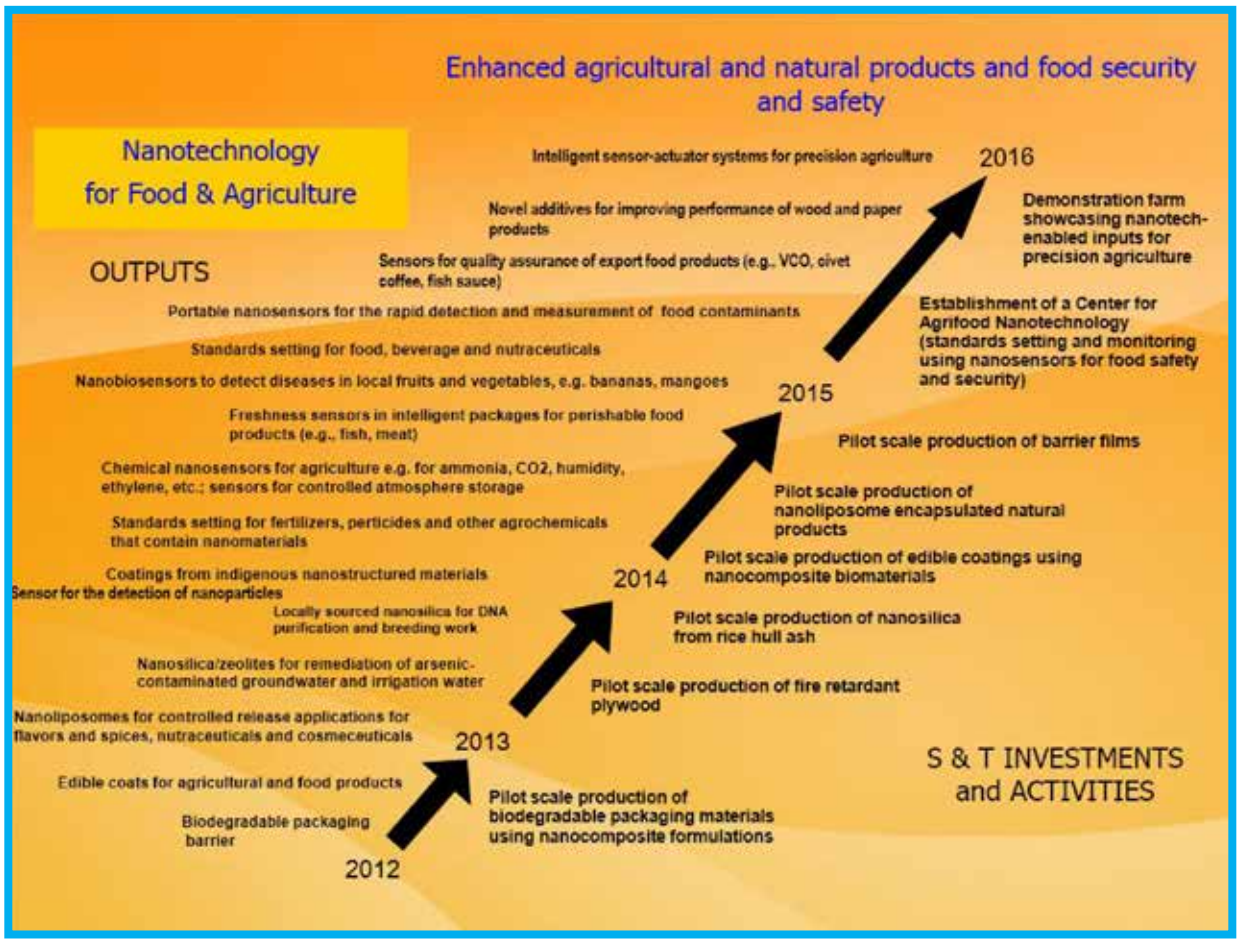

WIND ENERGY S&T ROADMAP
Increased Utilization on Local Windmill System
2014
TANGIBLE OUTPUT
2013
•On-site Wind Power Regime Assessment
• High Efficient Local Windmill System Developed
•Local Windmill Standards Developed
2012
•Promotion of Local Windmill (Upgraded System)
•Energy Efficiency & Performance Labeling for Windmill System
•Local Windmill System Standardization
2011
•Windmill Performance Test Facility Established
•Design Improvement & Efficiency Enhancement of Windmill Systems
2010
S&T ACTIVITIES
•Performance Validation of Locally Develop Windmill Systems
2009

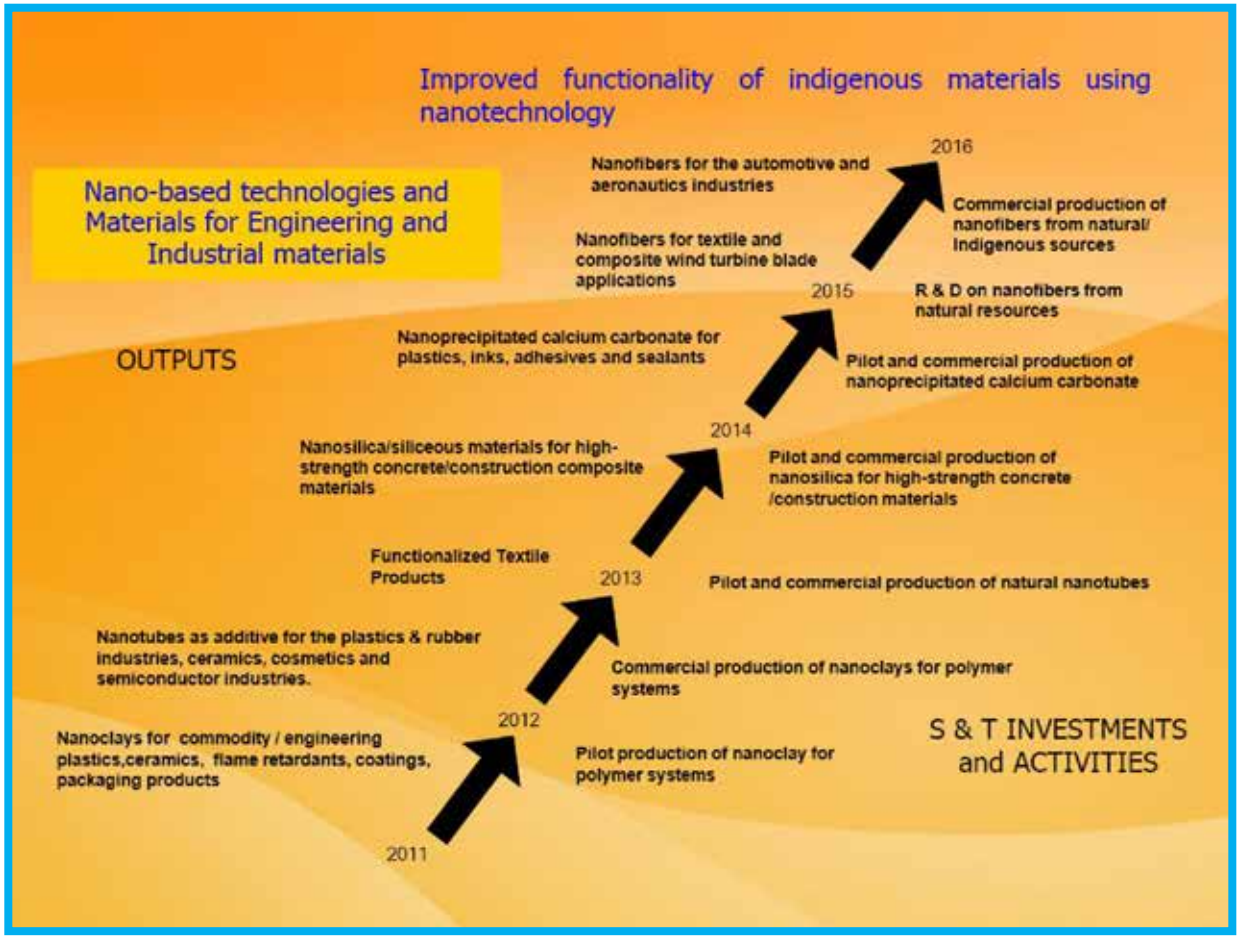

SMALL WIND TURBINE INDUSTRY ROADMAP
Goal: A developing small wind manufacturing industry
2016
Develop equipment and processes for mass production of small wind turbine systems
2015
Testing Center Established
Establish testing center and certification programs
2014
National standards for small wind turbines developed
Develop improved manufacturing techniques to improve reliability and reduce costs
2013
Detailed wind regime assessment in potential off-grid/remote communities
Develop national standards for small wind turbines
2012
Small Scale WTG Locally Developed
Conduct detailed wind regime assessment in potential off-grid/remote communities
2011
Install demonstration unit in area with high wind resource potential
Conduct design and efficiency improvement
2010
Conduct performance assessment and validation
Scan locally-available small wind turbine technologies and supply chain
TANGIBLE OUTPUT
S&T ACTIVITIES

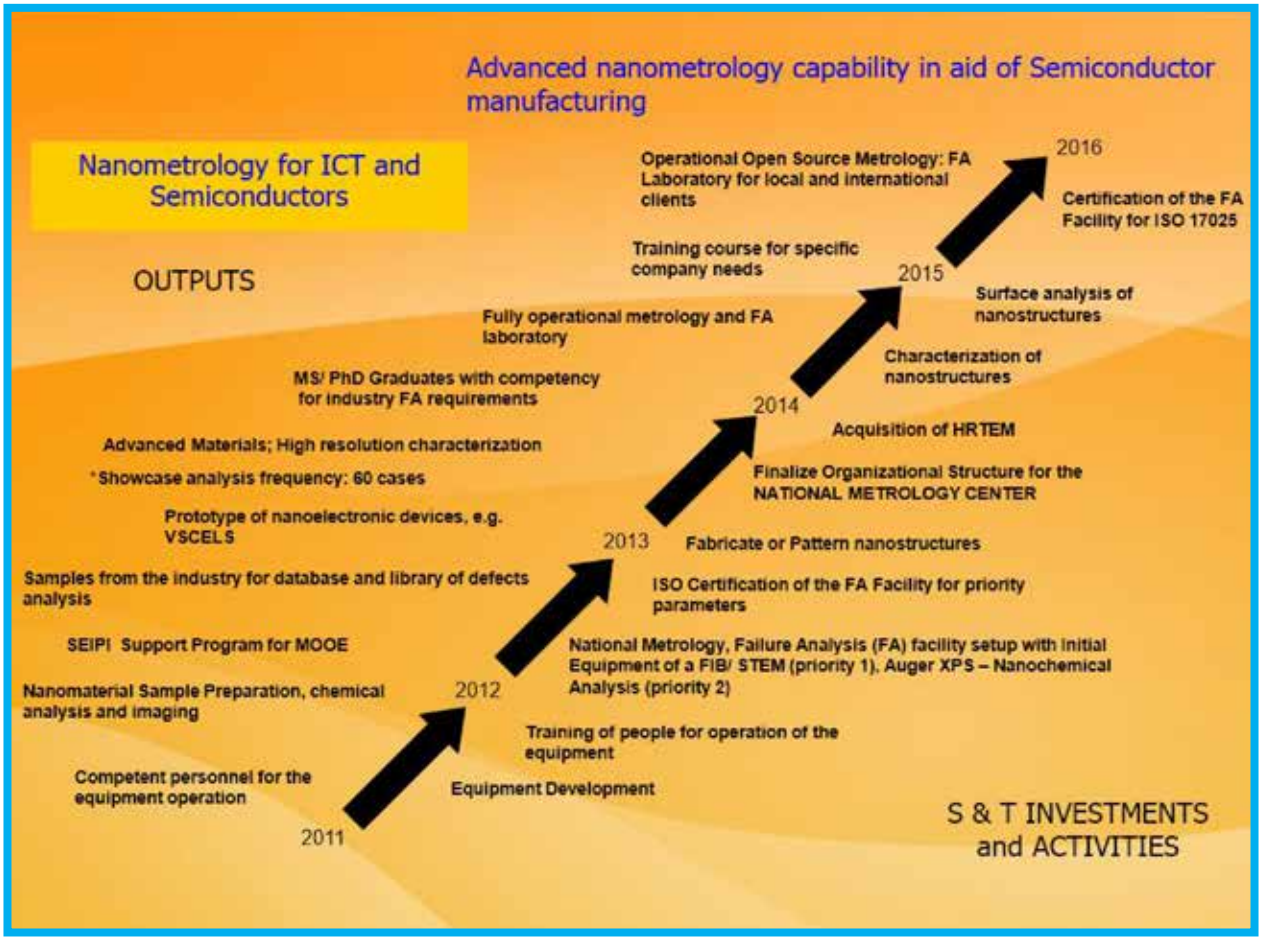
Nanotechnology Roadmaps

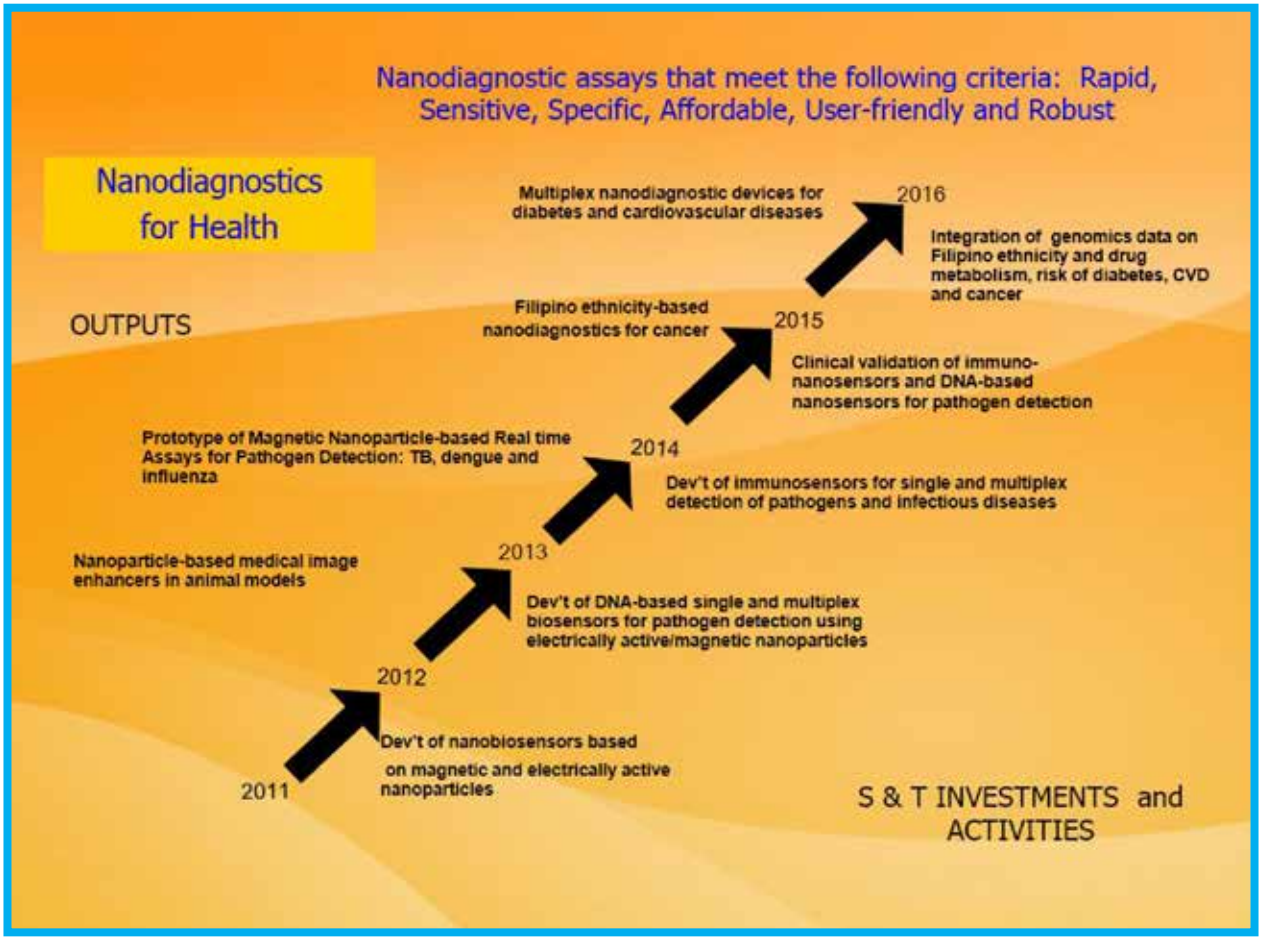
Nanotechnology, the technology that deals with understanding and control of matter at dimensions between 1 and 100 nanometers, is a powerful enabling platform that could lead to wide-ranging innovative products and applications like capturing and storing clean energy, developing next-generation computer chips, early detection of diseases, smart anti-cancer therapeutics and the like. Many industrialized nations have created centers of excellence in specific areas of nanotechnology to fully tap the technology's potential. This roadmap highlights the potential applications of nanotechnology in the country in terms of programs and projects that could bring innovations into our industries and major changes towards the improvement of quality of life.




Enhanced agricultural and natural products and food security and safety
Nanotechnology for Food & Agriculture
OUTPUTS
Intelligent sensor-actuator systems for precision agriculture
2016
Novel additives for improving performance of wood and paper products
Demonstration farm showcasing nanotech-enabled inputs for precision agriculture
Sensors for quality assurance of export food products (e.g., VCO, civet coffee, fish sauce)
Portable nanosensors for the rapid detection and measurement of food contaminants
Establishment of a Center for Agrifood Nanotechnology (standards setting and monitoring using nanosensors for food safety and security)
Standards setting for food, beverage and nutraceuticals
Nanobiosensors to detect diseases in local fruits and vegetables, e.g. bananas, mangoes
2015
Freshness sensors in intelligent packages for perishable food products (e.g., fish, meat)
Pilot scale production of barrier films
Chemical nanosensors for agriculture e.g. for ammonia, CO2, humidity, ethylene, etc.; sensors for controlled atmosphere storage
Pilot scale production of nanoliposome encapsulated natural products
Standards setting for fertilizers, perticides and other agrochemicals that contain nanomaterials
Pilot scale production of edible coatings using nanocomposite biomaterials
2014
Coatings from indigenous nanostructured materials
Sensor for the detection of nanoparticles
Locally sourced nanosilica for DNA purification and breeding work
Pilot scale production of nanosilica from rice hull ash
Nanosilica/zeolites for remediation of arsenic-contaminated groundwater and irrigation water
Pilot scale production of fire retardant plywood
Nanoliposomes for controlled release applications for flavors and spices, nutraceuticals and cosmeceuticals
2013
S & T INVESTMENTS and ACTIVITIES
Edible coats for agricultural and food products
Biodegradable packaging barrier
Pilot scale production of biodegradable packaging materials using nanocomposite formulations
2012


Improved functionality of indigenous materials using nanotechnology
Nano-based technologies and Materials for Engineering and Industrial materials
OUTPUTS
2016
Nanofibers for the automotive and aeronautics industries
Commercial production of nanofibers from natural/ indigenous sources
Nanofibers for textile and composite wind turbine blade applications
2015
R & D on nanofibers from natural resources
Nanoprecipitated calcium carbonate for plastics, inks, adhesives and sealants
Pilot and commercial production of nanoprecipitated calcium carbonate
2014
Nanosilica/siliceous materials for high-strength concrete/construction composite materials
Pilot and commercial production of nanosilica for high-strength concrete /construction materials
Functionalized Textile Products
2013
Pilot and commercial production of natural nanotubes
Nanotubes as additive for the plastics & rubber industries, ceramics, cosmetics and semiconductor industries.
Commercial production of nanoclays for polymer systems
2012
S & T INVESTMENTS and ACTIVITIES
Nanoclays for commodity / engineering plastics,ceramics, flame retardants, coatings, packaging products
Pilot production of nanoclay for polymer systems
2011

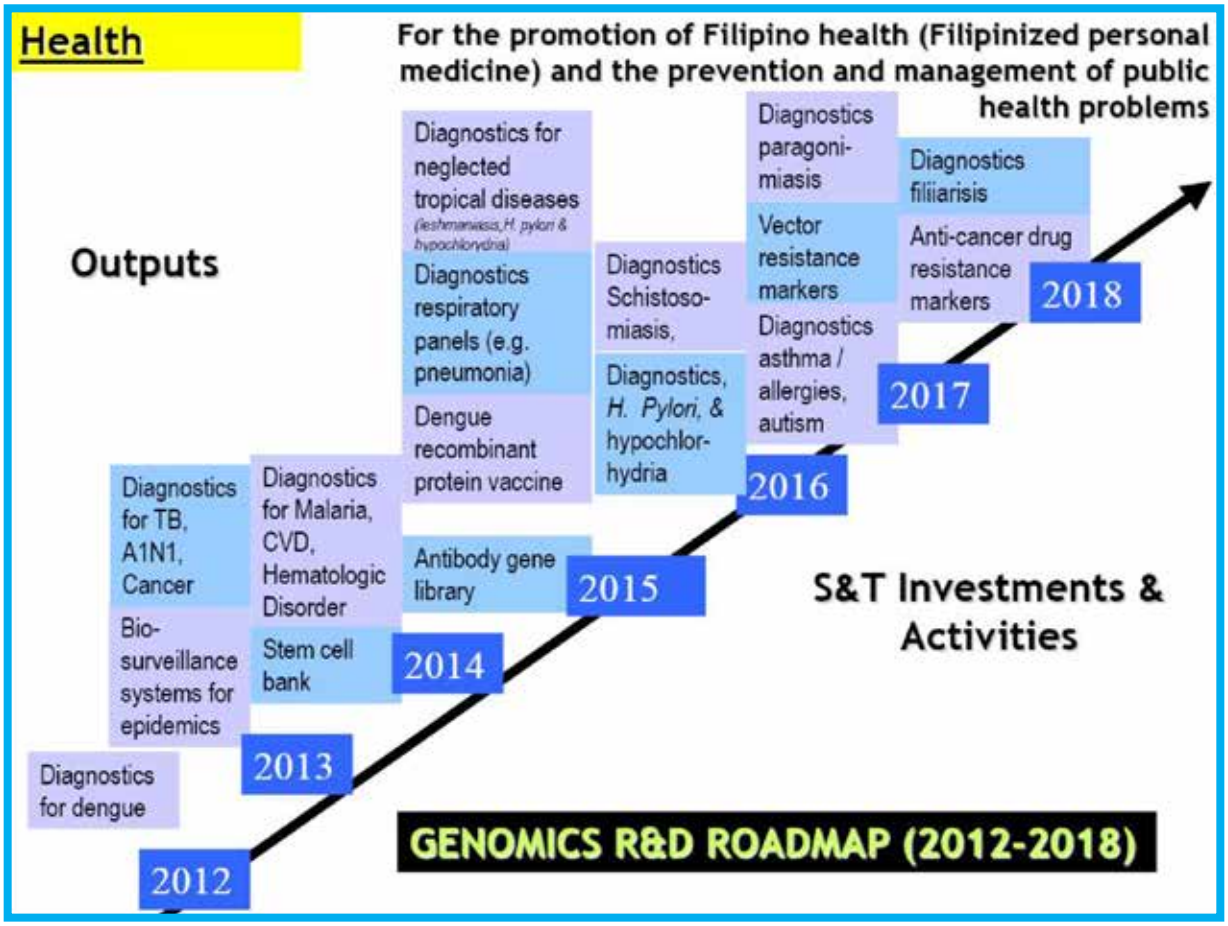

Advanced nanometrology capability in aid of Semiconductor manufacturing
Nanometrology for ICT and Semiconductors
OUTPUTS
2016
Operational Open Source Metrology: FA Laboratory for local and international clients
Certification of the FA Facility for ISO 17025
2015
Training course for specific company needs
Surface analysis of nanostructures
Fully operational metrology and FA laboratory
Characterization of nanostructures
MS/ PhD Graduates with competency for industry FA requirements
2014
Acquisition of HRTEM
Advanced Materials; High resolution characterization
Finalize Organizational Structure for the NATIONAL METROLOGY CENTER
*Showcase analysis frequency: 60 cases
Prototype of nanoelectronic devices, e.g. VSCELS
2013
Fabricate or Pattern nanostructures
Samples from the industry for database and library of defects analysis
ISO Certification of the FA Facility for priority parameters
SEIPI Support Program for MOOE
National Metrology, Failure Analysis (FA) facility setup with initial Equipment of a FIB/ STEM (priority 1), Auger XPS – Nanochemical Analysis (priority 2)
Nanomaterial Sample Preparation, chemical analysis and imaging
2012
Training of people for operation of the equipment
Competent personnel for the equipment operation
Equipment Development
2011
S & T INVESTMENTS and ACTIVITIES

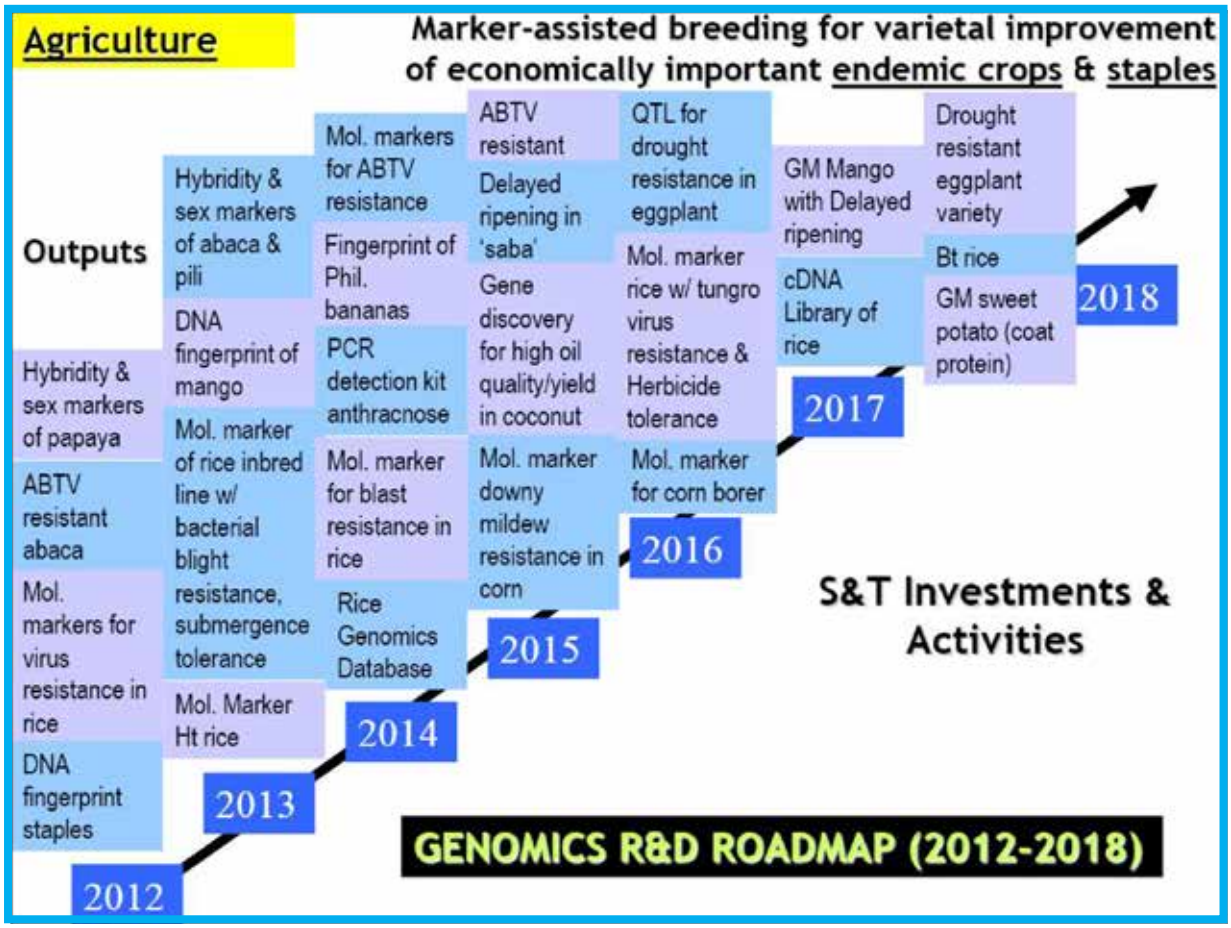

Nanodiagnostic assays that meet the following criteria: Rapid, Sensitive, Specific, Affordable, User-friendly and Robust
Nanodiagnostics for Health
OUTPUTS
2016
Multiplex nanodiagnostic devices for diabetes and cardiovascular diseases
Integration of genomics data on Filipino ethnicity and drug metabolism, risk of diabetes, CVD and cancer
2015
Filipino ethnicity-based nanodiagnostics for cancer
Clinical validation of immuno-nanosensors and DNA-based nanosensors for pathogen detection
2014
Prototype of Magnetic Nanoparticle-based Real time Assays for Pathogen Detection: TB, dengue and influenza
Dev't of immunosensors for single and multiplex detection of pathogens and infectious diseases
2013
Nanoparticle-based medical image enhancers in animal models
Dev't of DNA-based single and multiplex biosensors for pathogen detection using electrically active/magnetic nanoparticles
2012
Dev't of nanobiosensors based on magnetic and electrically active nanoparticles
2011
S & T INVESTMENTS and ACTIVITIES

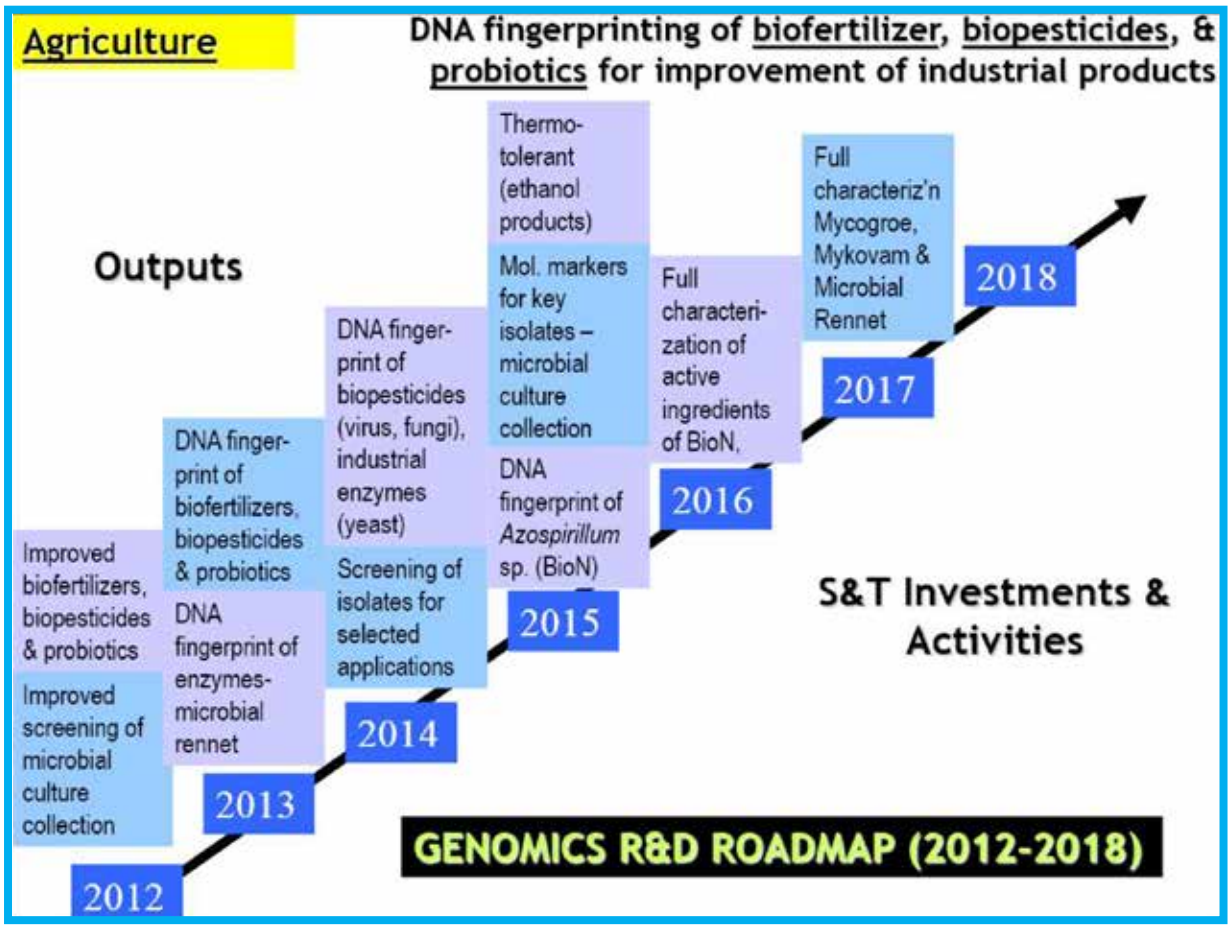
Genomics Roadmaps

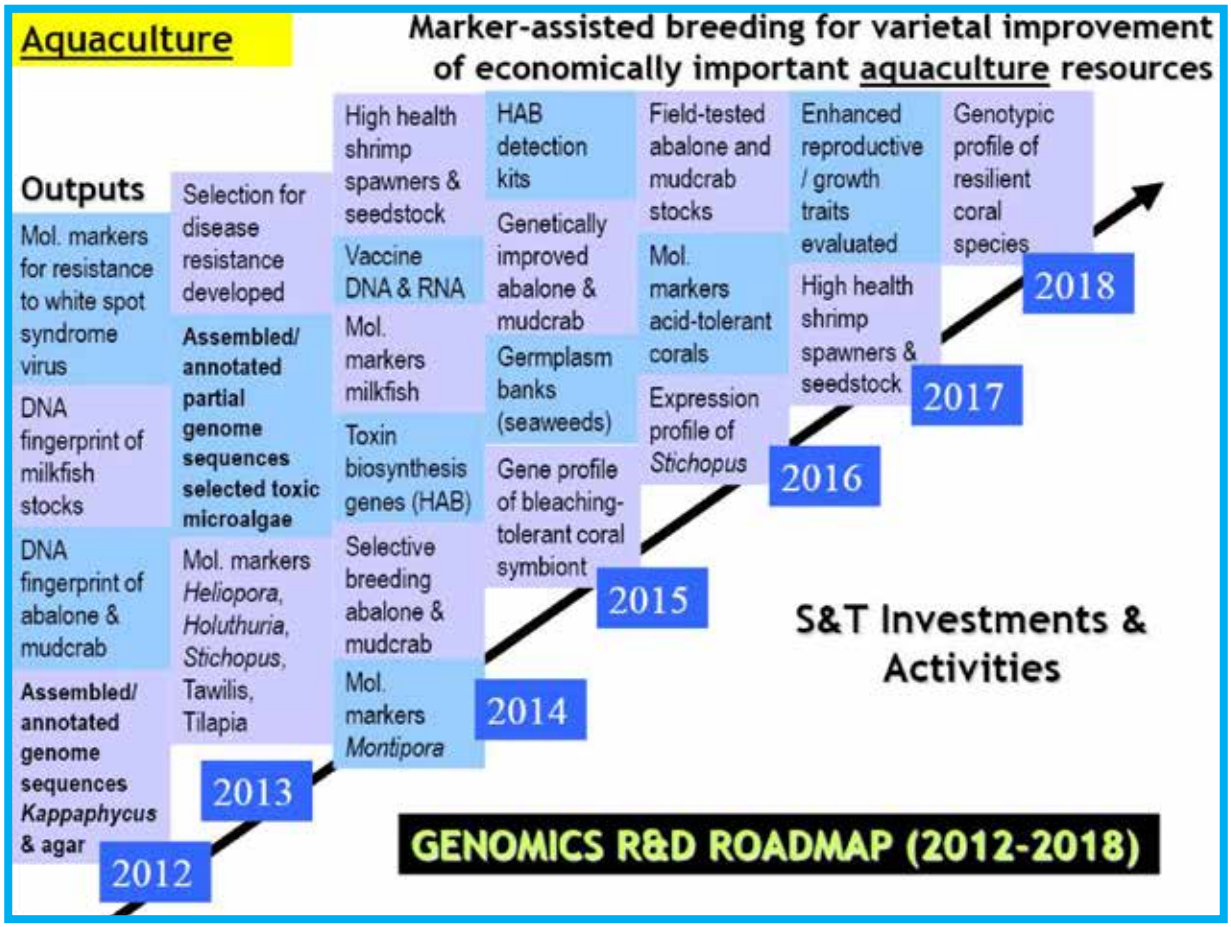
Genomics is a diverse field that involves study of functions and interactions of all genes in the genome, and their interactions with environmental factors of a particular organism. This technological platform will revolutionize R&D in health, agriculture and biodiversity for socio-economic development.

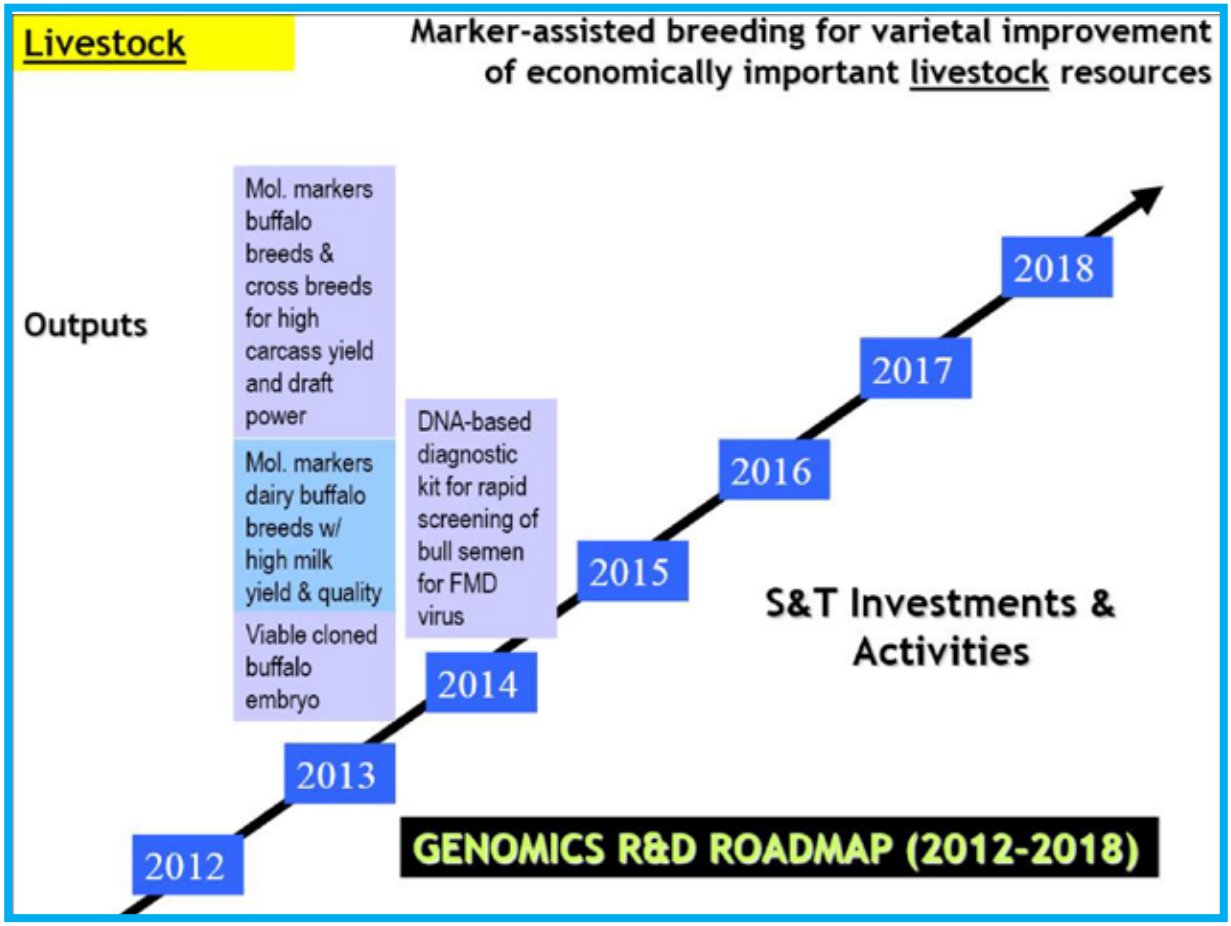
This roadmap presents the health applications of genomics including promotion of Filipino health (Filipinized personal medicine), prevention and management of public health problems, diagnostics for infectious and non-communicable diseases, development of vaccines, biosurveillance programs for epidemics and construction of a Gene Library and Bio Bank. The identified programs also cater to marker-assisted breeding for varietal improvement of economically important crops for agriculture and conservation; and will harness Philippine biodiversity for sustainable drug discovery and bioenergy production. The integration of genomics in the medico-legal system will pave way to improvement of Philippine forensics. Also, capability building shall be established for DNA Sequencing and Bioinformatics in support of the national genomics R&D agenda.




Agriculture
Marker-assisted breeding for varietal improvement of economically important endemic crops & staples
Outputs
Hybridity & sex markers of papaya
ABTV resistant abaca
Mol. markers for virus resistance in rice
DNA fingerprint staples
Hybridity & sex markers of abaca & pili
DNA fingerprint of mango
Mol. marker of rice inbred line w/ bacterial blight resistance, submergence tolerance
Mol. Marker Ht rice
Mol. markers for ABTV resistance
Fingerprint of Phil. bananas
PCR detection kit anthracnose
Mol. marker for blast resistance in rice
Rice Genomics Database
ABTV resistant
Delayed ripening in 'saba'
Gene discovery for high oil quality/yield in coconut
Mol. marker downy mildew resistance in corn
QTL for drought resistance in eggplant
Mol. marker rice w/ tungro virus resistance & Herbicide tolerance
Mol. marker for corn borer
GM Mango with Delayed ripening
cDNA Library of rice
Drought resistant eggplant variety
Bt rice
GM sweet potato (coat protein)
2012
2013
2014
2015
2016
2017
2018
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Agriculture
DNA fingerprinting of biofertilizer, biopesticides, & probiotics for improvement of industrial products
Outputs
Improved biofertilizers, biopesticides & probiotics
Improved screening of microbial culture collection
DNA finger-print of biofertilizers, biopesticides & probiotics
DNA fingerprint of enzymes-microbial rennet
DNA finger-print of biopesticides (virus, fungi), industrial enzymes (yeast)
Screening of isolates for selected applications
Thermo-tolerant (ethanol products)
Mol. markers for key isolates – microbial culture collection
DNA fingerprint of Azospirillum sp. (BioN)
Full characteri-zation of active ingredients of BioN.
Full characteriz'n Mycogroe, Mykovam & Microbial Rennet
2012
2013
2014
2015
2016
2017
2018
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Aquaculture
Marker-assisted breeding for varietal improvement of economically important aquaculture resources
Outputs
Mol. markers for resistance to white spot syndrome virus
DNA fingerprint of milkfish stocks
DNA fingerprint of abalone & mudcrab
Assembled/ annotated genome sequences *Kappaphycus* & agar
Selection for disease resistance developed
Assembled/ annotated partial genome sequences selected toxic microalgae
Mol. markers *Heliopora*, *Holuthuria*, *Stichopus*, Tawilis, Tilapia
High health shrimp spawners & seedstock
Vaccine DNA & RNA
Mol. markers milkfish
Toxin biosynthesis genes (HAB)
Selective breeding abalone & mudcrab
Mol. markers *Montipora*
HAB detection kits
Genetically improved abalone & mudcrab
Germplasm banks (seaweeds)
Gene profile of bleaching-tolerant coral symbiont
Field-tested abalone and mudcrab stocks
Mol. markers acid-tolerant corals
Expression profile of *Stichopus*
Enhanced reproductive / growth traits evaluated
High health shrimp spawners & seedstock
Genotypic profile of resilient coral species
2012
2013
2014
2015
2016
2017
2018
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Livestock
Marker-assisted breeding for varietal improvement of economically important livestock resources
Outputs
Mol. markers buffalo breeds & cross breeds for high carcass yield and draft power
Mol. markers dairy buffalo breeds w/ high milk yield & quality
Viable cloned buffalo embryo
DNA-based diagnostic kit for rapid screening of bull semen for FMD virus
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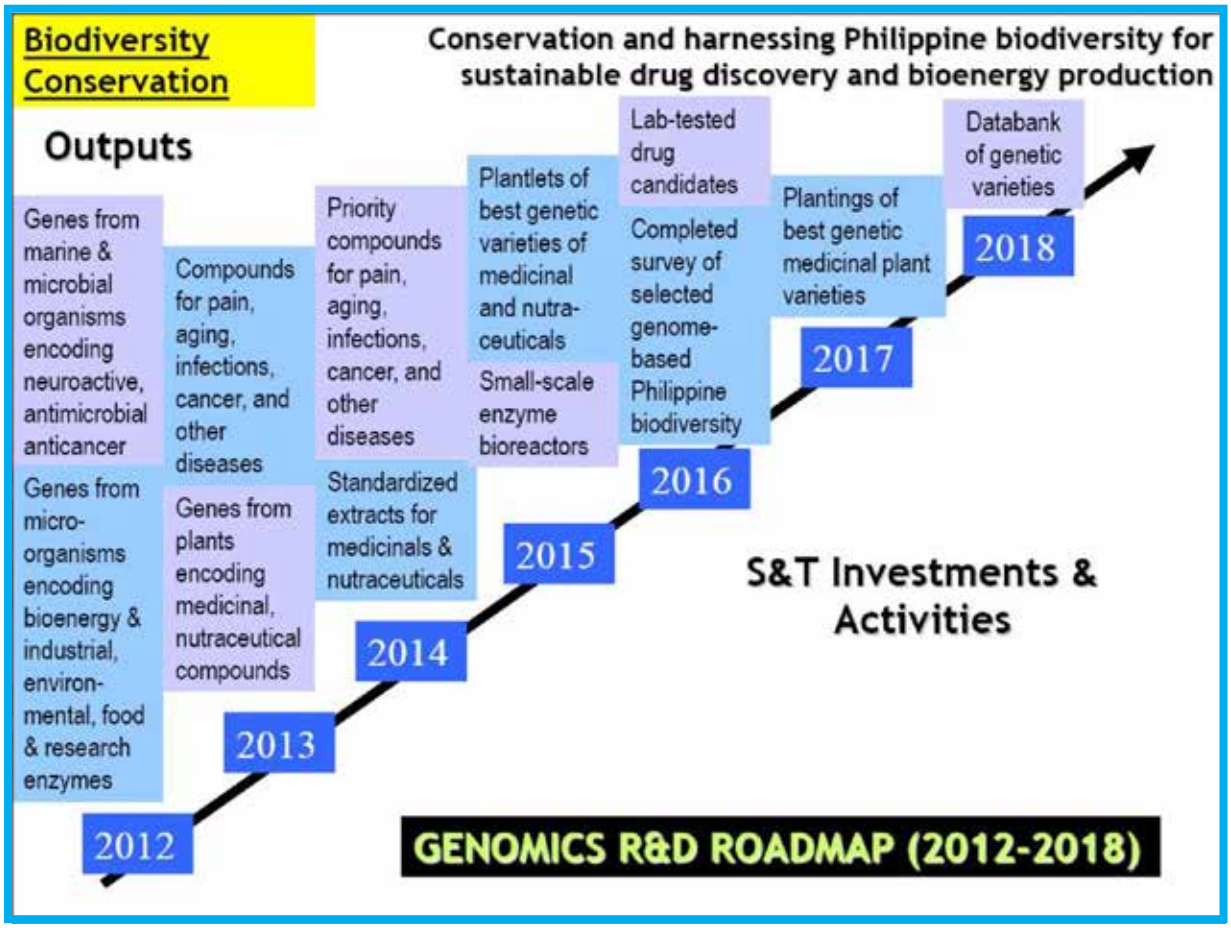
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Biodiversity Conservation
Conservation and harnessing Philippine biodiversity for sustainable drug discovery and bioenergy production
Outputs
Genes from marine & microbial organisms encoding neuroactive, antimicrobial anticancer
Genes from micro-organisms encoding bioenergy & industrial, environ-mental, food & research enzymes
Compounds for pain, aging, infections, cancer, and other diseases
Genes from plants encoding medicinal, nutraceutical compounds
Priority compounds for pain, aging, infections, cancer, and other diseases
Standardized extracts for medicinals & nutraceuticals
Plantlets of best genetic varieties of medicinal and nutra-ceuticals
Small-scale enzyme bioreactors
Lab-tested drug candidates
Completed survey of selected genome-based Philippine biodiversity
Plantings of best genetic medicinal plant varieties
Databank of genetic varieties
2012
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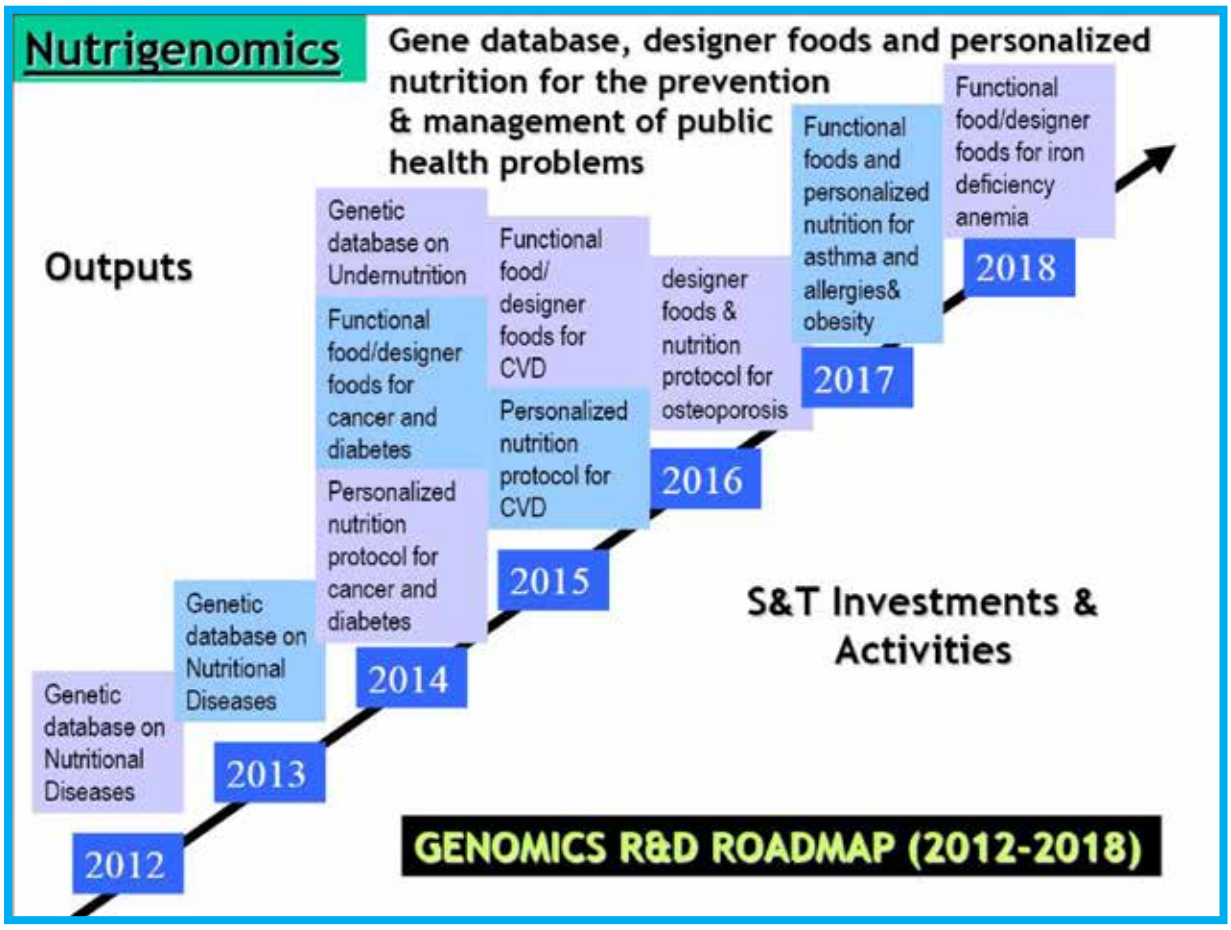
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Nutrigenomics
Gene database, designer foods and personalized nutrition for the prevention & management of public health problems
Outputs
Genetic database on Nutritional Diseases
Genetic database on Nutritional Diseases
Functional food/designer foods for cancer and diabetes
Personalized nutrition protocol for cancer and diabetes
Genetic database on Undernutrition
Functional food/ designer foods for CVD
Personalized nutrition protocol for CVD
designer foods & nutrition protocol for osteoporosis
Functional foods and personalized nutrition for asthma and allergies& obesity
Functional food/designer foods for iron deficiency anemia
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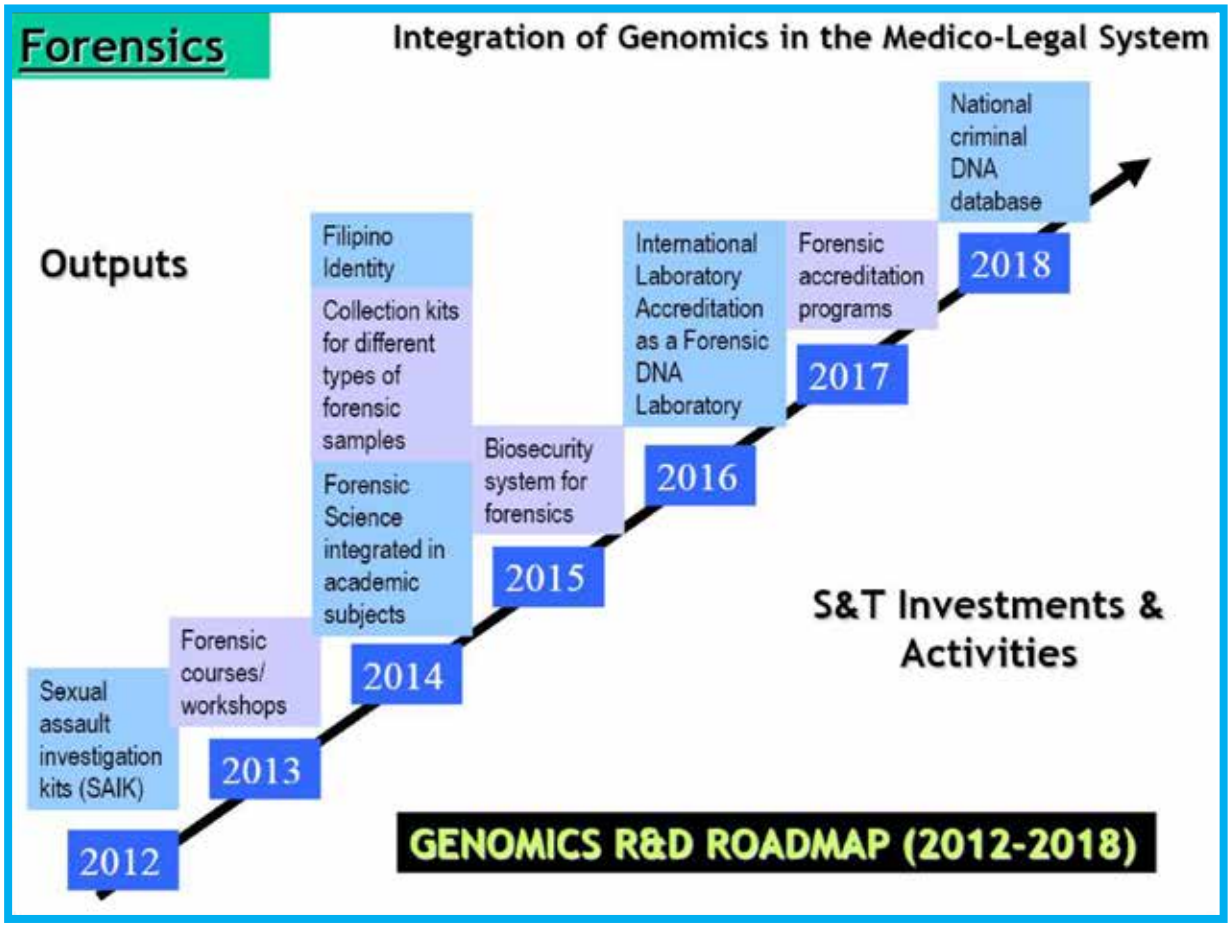
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Forensics
Integration of Genomics in the Medico-Legal System
Outputs
Sexual assault investigation kits (SAIK)
Forensic courses/ workshops
Filipino Identity
Collection kits for different types of forensic samples
Forensic Science integrated in academic subjects
Biosecurity system for forensics
International Laboratory Accreditation as a Forensic DNA Laboratory
Forensic accreditation programs
National criminal DNA database
2012
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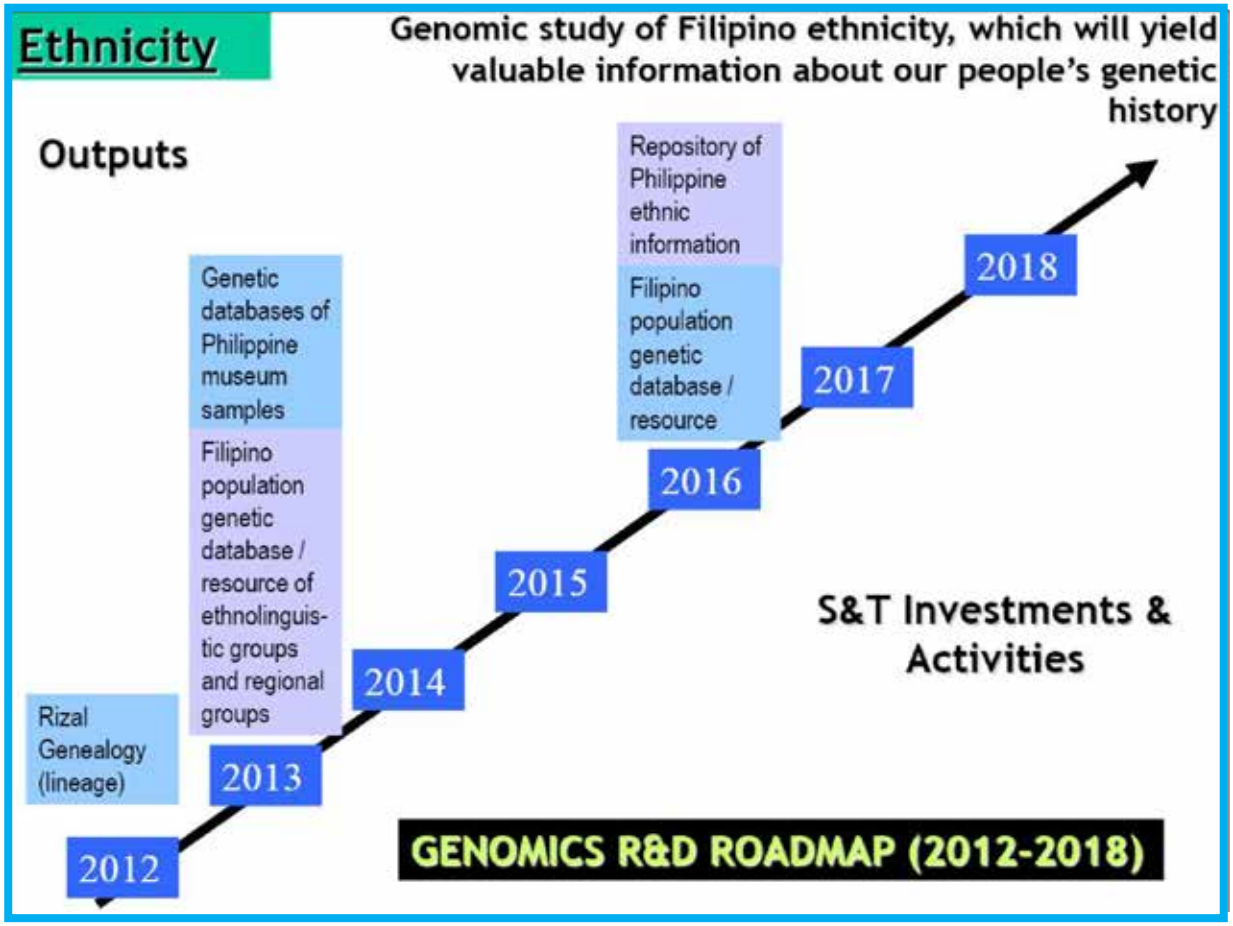
2018
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


Ethnicity
Genomic study of Filipino ethnicity, which will yield valuable information about our people's genetic history
Outputs
Rizal Genealogy (lineage)
Genetic databases of Philippine museum samples
Filipino population genetic database / resource of ethnolinguis-tic groups and regional groups
Repository of Philippine ethnic information
Filipino population genetic database / resource
2012
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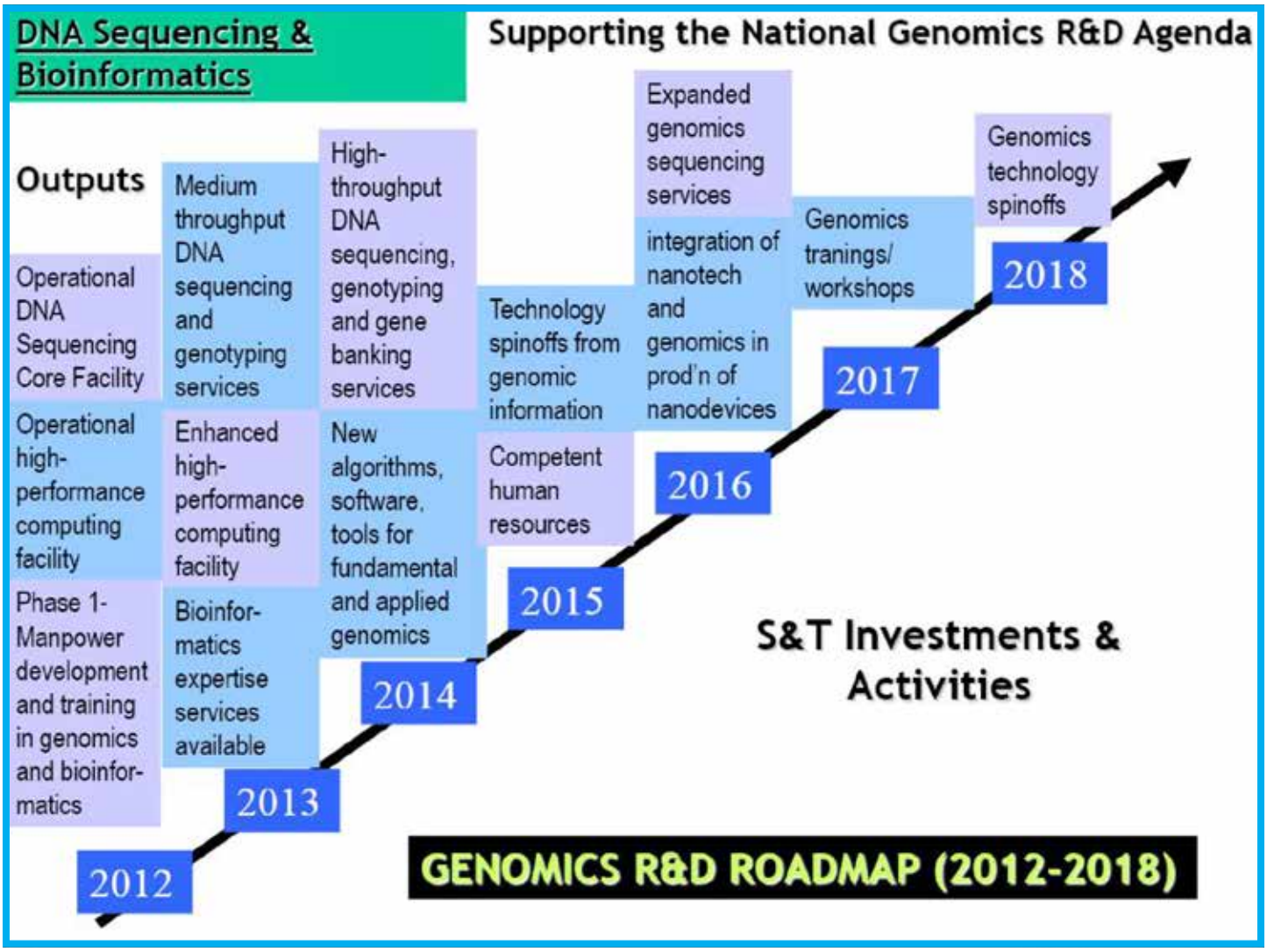
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)


DNA Sequencing & Bioinformatics
Supporting the National Genomics R&D Agenda
Outputs
Operational DNA Sequencing Core Facility
Operational high-performance computing facility
Phase 1- Manpower development and training in genomics and bioinfor-matics
Medium throughput DNA sequencing and genotyping services
Enhanced high-performance computing facility
Bioinfor-matics expertise services available
High-throughput DNA sequencing, genotyping and gene banking services
New algorithms, software, tools for fundamental and applied genomics
Technology spinoffs from genomic information
Competent human resources
Expanded genomics sequencing services
integration of nanotech and genomics in prod'n of nanodevices
Genomics tranings/ workshops
Genomics technology spinoffs
2012
2013
2014
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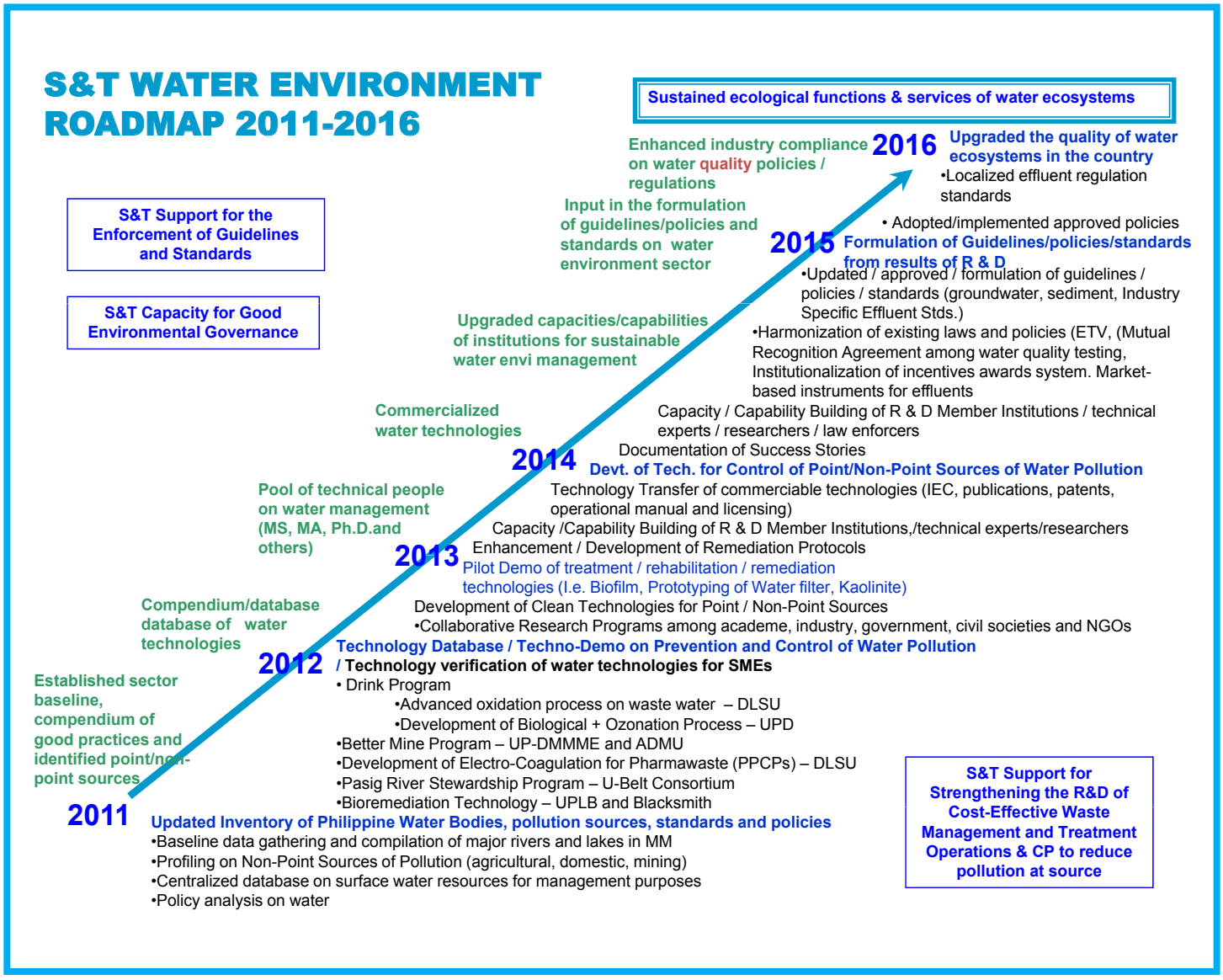
2018
S&T Investments & Activities
GENOMICS R&D ROADMAP (2012-2018)

S&T Water Environment Roadmap

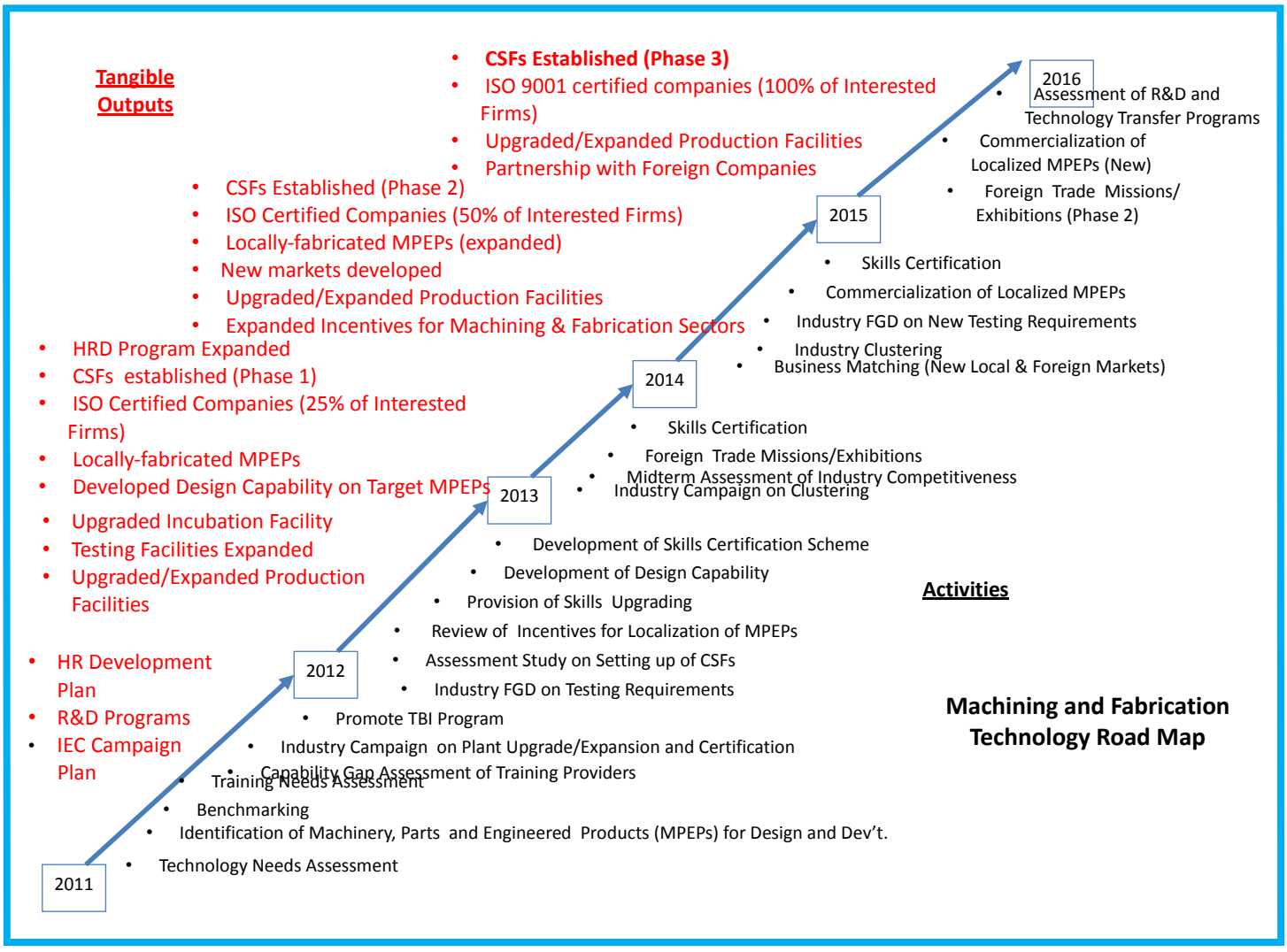
A top PCIEERD advocacy is addressing environment issues by providing cleaner and safer technologies that respond to critical concerns on industrial wastewater, waste management, safe and potable drinking water, use of biotechnological approaches for biodiversity conservation and other pressing environmental problems. Ecological functions and services of water ecosystems should be sustained through generations. This roadmap is a collaborative effort among NGAs, academe, private sector, NGOs and other stakeholders in the sector. It sets the direction to meet the sector challenges and objectives by 2016. It was drafted in line with the National Science and Technology Plan (NSTP), Presidential Coordinating Council on R & D (PCCRD), Medium-Term Philippine Development Plan (MTPDP) and 2015 Millennium Development Goals (MDG), and Philippine Clean Water Act of 2004 (Republic Act No. 9275).



Metals and Manufacturing Roadmaps

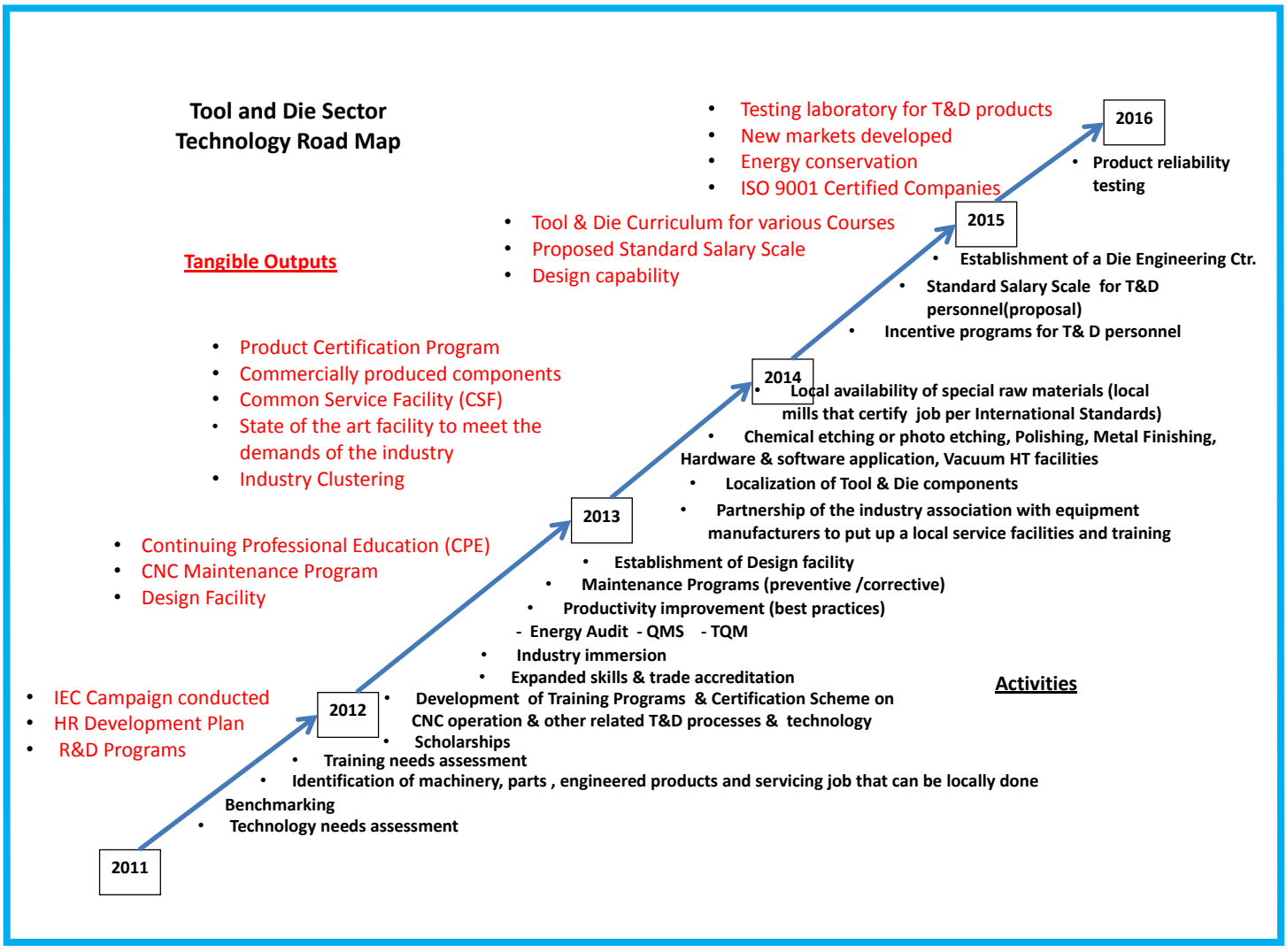
Machining and Fabrication

The roadmap envisions a machining and fabrication sector that is capable of providing globally competitive products, machinery and services. The objectives are: a) support the manpower development needs b) support the equipment upgrading requirements, and c) develop new markets for the local machining and fabrication sector.



Tool and Die

A viable and competitive tool and die industry will be developed. A priority is the establishment of common service facilities e.g. vacuum heat treatment. Attention should also be given in supporting manpower development needs and equipment upgrading.

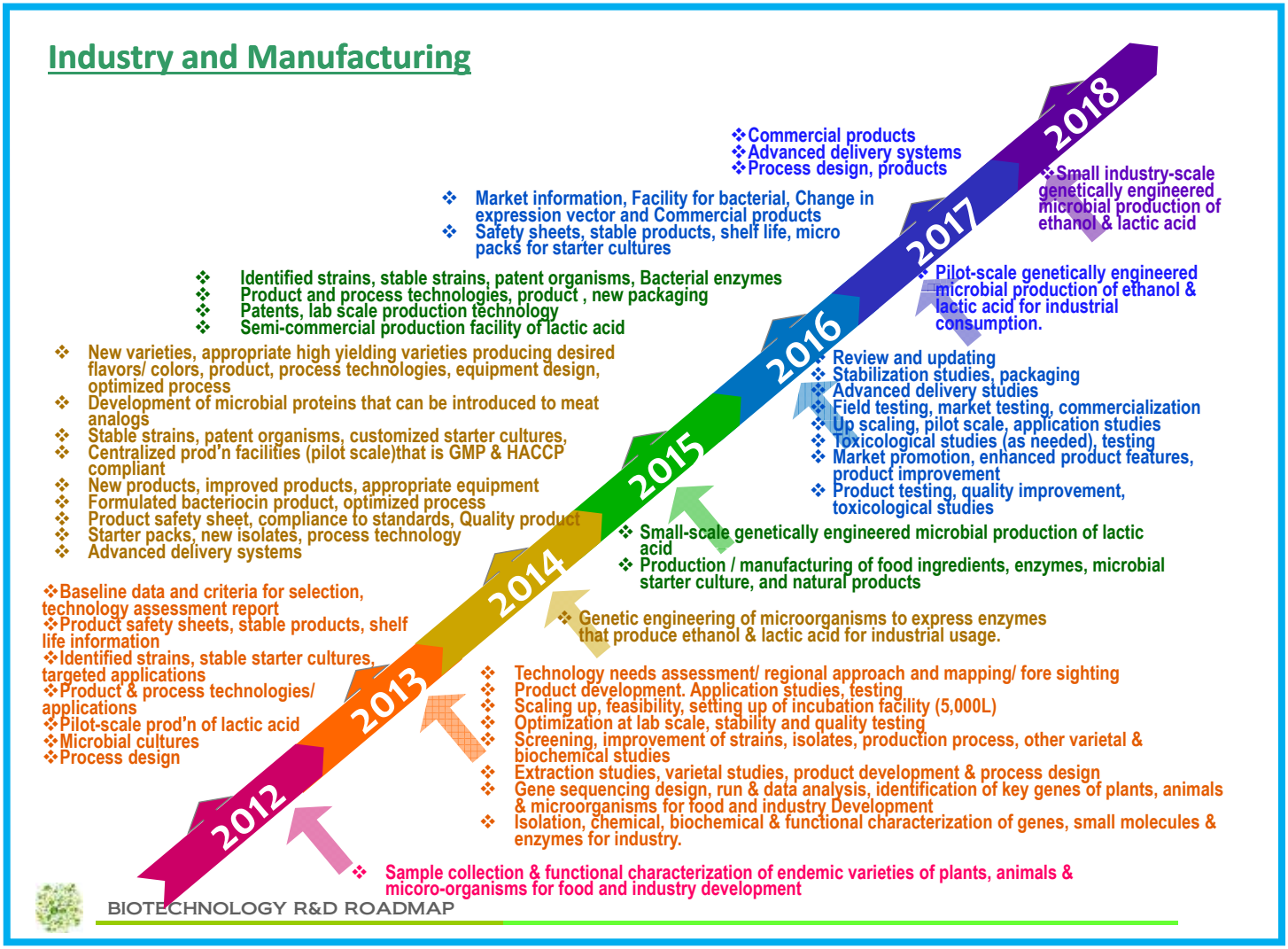


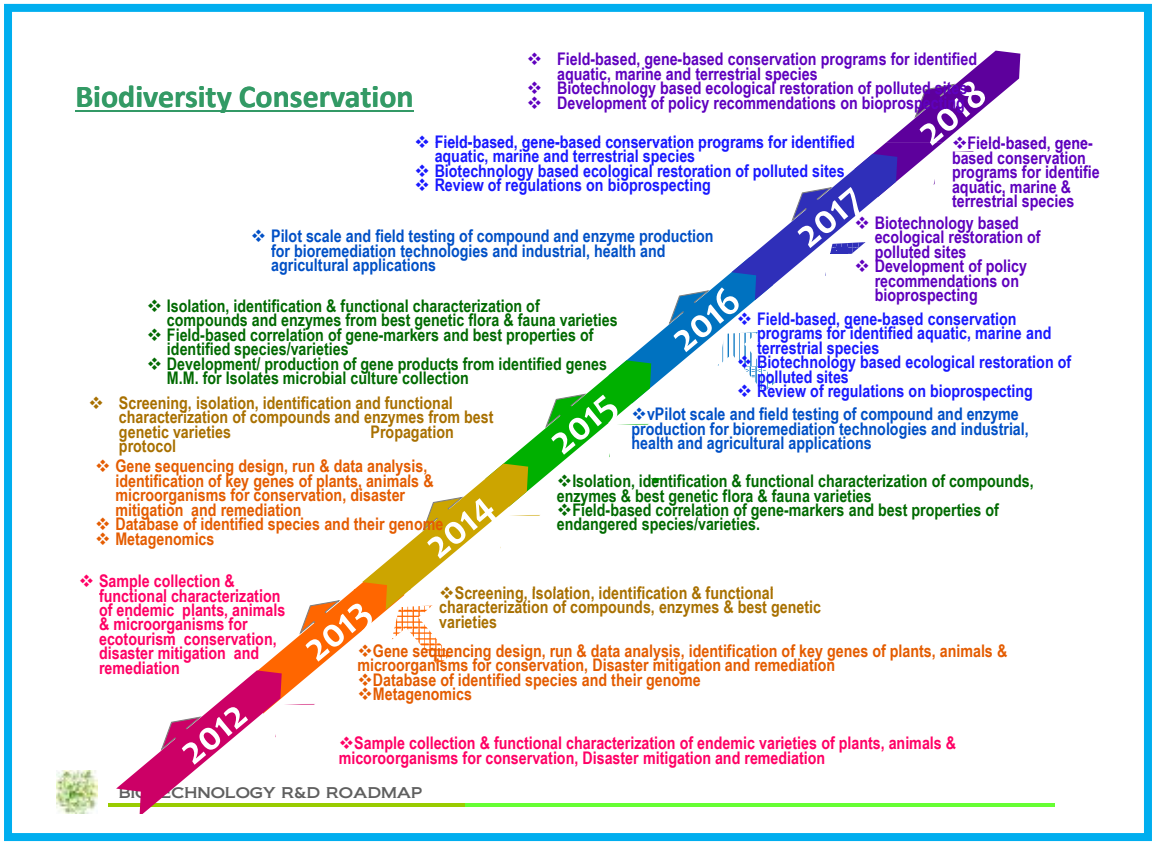
Metalcasting

This roadmap looks at an export capable and competitive metalcasting industry providing quality products and services. To boost the export potential of the sector, the programs for the industry should support manpower development needs and capability building initiatives.

National Biotechnology R&D Roadmaps

The Convention on Biological Diversity (CBD) defines biotechnology as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use". To come up with a national biotechnology R & D roadmap (2012-2018), the PCIEERD has conducted a series of workshops with experts and stakeholders using the initial output of the PCCRD-Technical Working Group on Biotechnology. Through biotechnology, the DOST aims to (1) increase national productivity and global competitiveness of products/processes/services, (2) protect and conserve the environment and biodiversity, (3) accelerate manpower and infrastructure development for biotechnology, and (4) promote the role of science in national development. The sub-areas covered in this roadmap include agri-biotech, health biotech, industrial biotechnology, biotechnology for conservation of biodiversity and bioremediation, and biofuels.




Biodiversity Conservation
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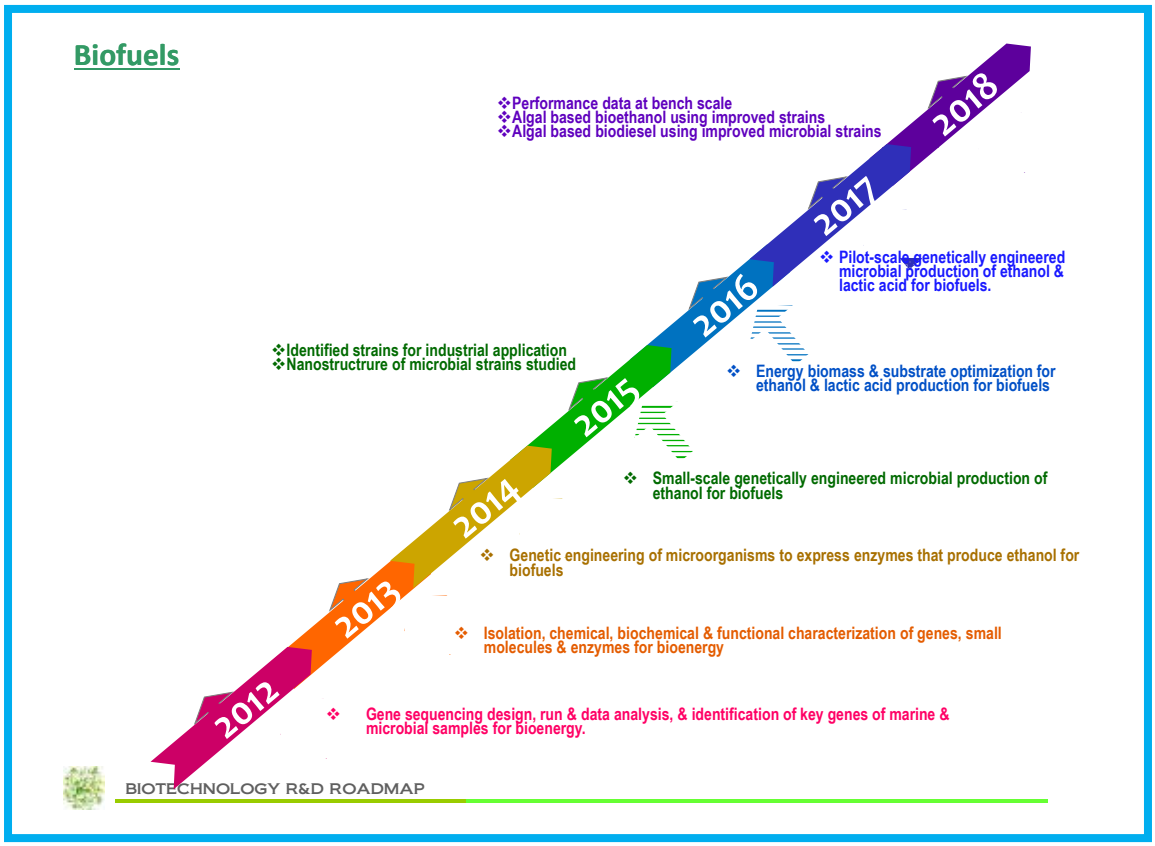
❖ Sample collection & functional characterization of endemic plants, animals & microorganisms for ecotourism conservation, disaster mitigation and remediation
❖ Screening, isolation, identification and functional characterization of compounds and enzymes from best genetic varieties Propagation protocol
❖ Gene sequencing design, run & data analysis, identification of key genes of plants, animals & microorganisms for conservation, disaster mitigation and remediation
❖ Database of identified species and their genome
❖ Metagenomics
❖ Isolation, identification & functional characterization of compounds and enzymes from best genetic flora & fauna varieties
❖ Field-based correlation of gene-markers and best properties of identified species/varieties
❖ Development/ production of gene products from identified genes M.M. for Isolates microbial culture collection
❖ Pilot scale and field testing of compound and enzyme production for bioremediation technologies and industrial, health and agricultural applications
❖ Field-based, gene-based conservation programs for identified aquatic, marine and terrestrial species
❖ Biotechnology based ecological restoration of polluted sites
❖ Review of regulations on bioprospecting
❖ Field-based, gene-based conservation programs for identified aquatic, marine and terrestrial species
❖ Biotechnology based ecological restoration of polluted sites
❖ Development of policy recommendations on bioprospecting
❖ Sample collection & functional characterization of endemic varieties of plants, animals & micoroorganisms for conservation, Disaster mitigation and remediation
❖ Gene sequencing design, run & data analysis, identification of key genes of plants, animals & microorganisms for conservation, Disaster mitigation and remediation
❖ Database of identified species and their genome
❖ Metagenomics
❖ Screening, Isolation, identification & functional characterization of compounds, enzymes & best genetic varieties
❖ Isolation, identification & functional characterization of compounds, enzymes & best genetic flora & fauna varieties
❖ Field-based correlation of gene-markers and best properties of endangered species/varieties.
❖ vPilot scale and field testing of compound and enzyme production for bioremediation technologies and industrial, health and agricultural applications
❖ Field-based, gene-based conservation programs for identified aquatic, marine and terrestrial species
❖ Biotechnology based ecological restoration of polluted sites
❖ Review of regulations on bioprospecting
❖ Field-based, gene-based conservation programs for identifie aquatic, marine & terrestrial species
❖ Biotechnology based ecological restoration of polluted sites
❖ Development of policy recommendations on bioprospecting
BIOTECHNOLOGY R&D ROADMAP


Biofuels
2012
2013
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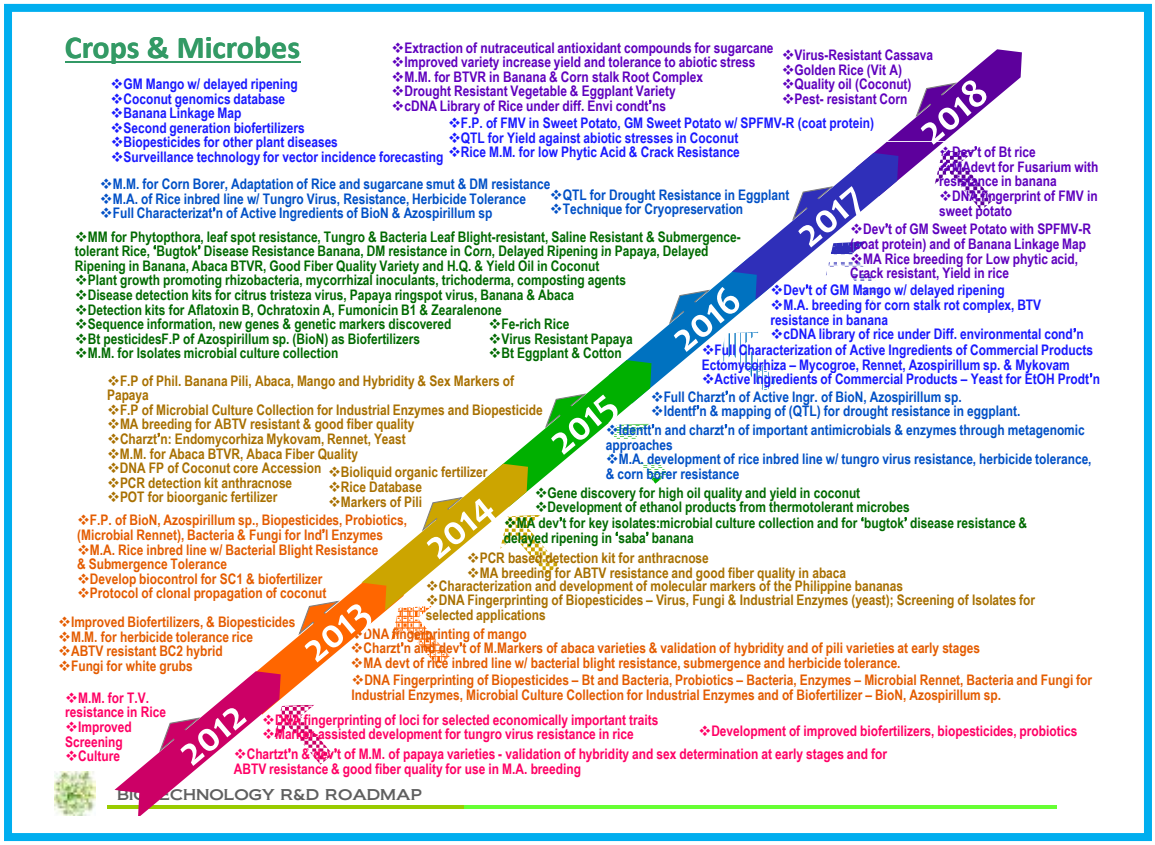
2018
❖ Gene sequencing design, run & data analysis, & identification of key genes of marine & microbial samples for bioenergy.
❖ Isolation, chemical, biochemical & functional characterization of genes, small molecules & enzymes for bioenergy
❖ Genetic engineering of microorganisms to express enzymes that produce ethanol for biofuels
❖ Small-scale genetically engineered microbial production of ethanol for biofuels
❖ Energy biomass & substrate optimization for ethanol & lactic acid production for biofuels
❖ Pilot-scale genetically engineered microbial production of ethanol & lactic acid for biofuels.
❖ Identified strains for industrial application
❖ Nanostructrure of microbial strains studied
❖ Performance data at bench scale
❖ Algal based bioethanol using improved strains
❖ Algal based biodiesel using improved microbial strains
BIOTECHNOLOGY R&D ROADMAP


Crops & Microbes
❖GM Mango w/ delayed ripening
❖Coconut genomics database
❖Banana Linkage Map
❖Second generation biofertilizers
❖Biopesticides for other plant diseases
❖Surveillance technology for vector incidence forecasting
❖Extraction of nutraceutical antioxidant compounds for sugarcane
❖Improved variety increase yield and tolerance to abiotic stress
❖M.M. for BTVR in Banana & Corn stalk Root Complex
❖Drought Resistant Vegetable & Eggplant Variety
❖cDNA Library of Rice under diff. Envi condt'ns
❖F.P. of FMV in Sweet Potato, GM Sweet Potato w/ SPFMV-R (coat protein)
❖QTL for Yield against abiotic stresses in Coconut
❖Rice M.M. for low Phytic Acid & Crack Resistance
❖Virus-Resistant Cassava
❖Golden Rice (Vit A)
❖Quality oil (Coconut)
❖Pest- resistant Corn
❖M.M. for Corn Borer, Adaptation of Rice and sugarcane smut & DM resistance
❖M.A. of Rice inbred line w/ Tungro Virus, Resistance, Herbicide Tolerance
❖Full Characterizat'n of Active Ingredients of BioN & Azospirillum sp
❖QTL for Drought Resistance in Eggplant
❖Technique for Cryopreservation
❖Dev't of Bt rice
❖Mdevt for Fusarium with resistance in banana
❖DNA fingerprint of FMV in sweet potato
❖MM for Phytopthora, leaf spot resistance, Tungro & Bacteria Leaf Blight-resistant, Saline Resistant & Submergence-tolerant Rice, 'Bugtok' Disease Resistance Banana, DM resistance in Corn, Delayed Ripening in Papaya, Delayed Ripening in Banana, Abaca BTVR, Good Fiber Quality Variety and H.Q. & Yield Oil in Coconut
❖Plant growth promoting rhizobacteria, mycorrhizal inoculants, trichoderma, composting agents
❖Disease detection kits for citrus tristeza virus, Papaya ringspot virus, Banana & Abaca
❖Detection kits for Aflatoxin B, Ochratoxin A, Fumonicin B1 & Zearalenone
❖Sequence information, new genes & genetic markers discovered
❖Bt pesticidesF.P of Azospirillum sp. (BioN) as Biofertilizers
❖M.M. for Isolates microbial culture collection
❖Fe-rich Rice
❖Virus Resistant Papaya
❖Bt Eggplant & Cotton
❖Dev't of GM Sweet Potato with SPFMV-R (coat protein) and of Banana Linkage Map
❖MA Rice breeding for Low phytic acid, Crack resistant, Yield in rice
❖Dev't of GM Mango w/ delayed ripening
❖M.A. breeding for corn stalk rot complex, BTV resistance in banana
❖cDNA library of rice under Diff. environmental cond'n
❖Full Characterization of Active Ingredients of Commercial Products Ectomycorhiza – Mycogroe, Rennet, Azospirillum sp. & Mykovam
❖Active Ingredients of Commercial Products – Yeast for EtOH Prodt'n
❖F.P of Phil. Banana Pili, Abaca, Mango and Hybridity & Sex Markers of Papaya
❖F.P of Microbial Culture Collection for Industrial Enzymes and Biopesticide
❖MA breeding for ABTV resistant & good fiber quality
❖Charzt'n: Endomycorhiza Mykovam, Rennet, Yeast
❖M.M. for Abaca BTVR, Abaca Fiber Quality
❖DNA FP of Coconut core Accession
❖PCR detection kit anthracnose
❖POT for bioorganic fertilizer
❖Bioliquid organic fertilizer
❖Rice Database
❖Markers of Pili
❖Full Charzt'n of Active Ingr. of BioN, Azospirillum sp.
❖Identf'n & mapping of (QTL) for drought resistance in eggplant.
❖Identif'n and charzt'n of important antimicrobials & enzymes through metagenomic approaches
❖M.A. development of rice inbred line w/ tungro virus resistance, herbicide tolerance, & corn borer resistance
❖Gene discovery for high oil quality and yield in coconut
❖Development of ethanol products from thermotolerant microbes
❖F.P. of BioN, Azospirillum sp., Biopesticides, Probiotics, (Microbial Rennet), Bacteria & Fungi for Ind'l Enzymes
❖M.A. Rice inbred line w/ Bacterial Blight Resistance & Submergence Tolerance
❖Develop biocontrol for SC1 & biofertilizer
❖Protocol of clonal propagation of coconut
❖MA dev't for key isolates:microbial culture collection and for 'bugtok' disease resistance & delayed ripening in 'saba' banana
❖PCR based detection kit for anthracnose
❖MA breeding for ABTV resistance and good fiber quality in abaca
❖Characterization and development of molecular markers of the Philippine bananas
❖DNA Fingerprinting of Biopesticides – Virus, Fungi & Industrial Enzymes (yeast); Screening of Isolates for selected applications
❖Improved Biofertilizers, & Biopesticides
❖M.M. for herbicide tolerance rice
❖ABTV resistant BC2 hybrid
❖Fungi for white grubs
❖DNA fingerprinting of mango
❖Charzt'n and dev't of M.Markers of abaca varieties & validation of hybridity and of pili varieties at early stages
❖MA devt of rice inbred line w/ bacterial blight resistance, submergence and herbicide tolerance.
❖DNA Fingerprinting of Biopesticides – Bt and Bacteria, Probiotics – Bacteria, Enzymes – Microbial Rennet, Bacteria and Fungi for Industrial Enzymes, Microbial Culture Collection for Industrial Enzymes and of Biofertilizer – BioN, Azospirillum sp.
❖M.M. for T.V. resistance in Rice
❖Improved Screening
❖Culture
❖Fingerprinting of loci for selected economically important traits
❖Marker assisted development for tungro virus resistance in rice
❖Development of improved biofertilizers, biopesticides, probiotics
❖Chartzt'n & dev't of M.M. of papaya varieties - validation of hybridity and sex determination at early stages and for ABTV resistance & good fiber quality for use in M.A. breeding
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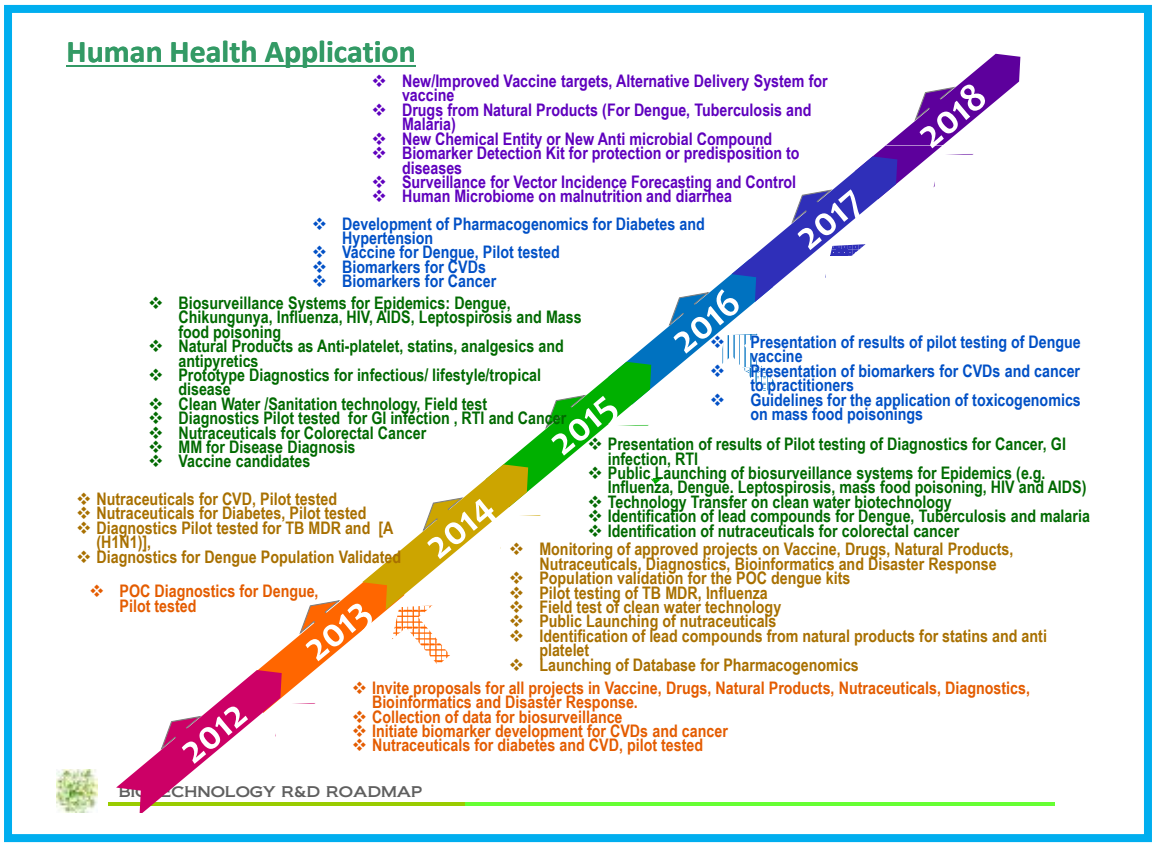
BIOTECHNOLOGY R&D ROADMAP


Human Health Application
❖New/Improved Vaccine targets, Alternative Delivery System for vaccine
❖Drugs from Natural Products (For Dengue, Tuberculosis and Malaria)
❖New Chemical Entity or New Anti microbial Compound
❖Biomarker Detection Kit for protection or predisposition to diseases
❖Surveillance for Vector Incidence Forecasting and Control
❖Human Microbiome on malnutrition and diarrhea
❖Development of Pharmacogenomics for Diabetes and Hypertension
❖Vaccine for Dengue, Pilot tested
❖Biomarkers for CVDs
❖Biomarkers for Cancer
❖Biosurveillance Systems for Epidemics: Dengue, Chikungunya, Influenza, HIV, AIDS, Leptospirosis and Mass food poisoning
❖Natural Products as Anti-platelet, statins, analgesics and antipyretics
❖Prototype Diagnostics for infectious/ lifestyle/tropical disease
❖Clean Water /Sanitation technology, Field test
❖Diagnostics Pilot tested for GI infection , RTI and Cancer
❖Nutraceuticals for Colorectal Cancer
❖MM for Disease Diagnosis
❖Vaccine candidates
❖Presentation of results of pilot testing of Dengue vaccine
❖Presentation of biomarkers for CVDs and cancer to practitioners
❖Guidelines for the application of toxicogenomics on mass food poisonings
❖Presentation of results of Pilot testing of Diagnostics for Cancer, GI infection, RTI
❖Public Launching of biosurveillance systems for Epidemics (e.g. Influenza, Dengue. Leptospirosis, mass food poisoning, HIV and AIDS)
❖Technology Transfer on clean water biotechnology
❖Identification of lead compounds for Dengue, Tuberculosis and malaria
❖Identification of nutraceuticals for colorectal cancer
❖Nutraceuticals for CVD, Pilot tested
❖Nutraceuticals for Diabetes, Pilot tested
❖Diagnostics Pilot tested for TB MDR and [A (H1N1)],
❖Diagnostics for Dengue Population Validated
❖POC Diagnostics for Dengue, Pilot tested
❖Monitoring of approved projects on Vaccine, Drugs, Natural Products, Nutraceuticals, Diagnostics, Bioinformatics and Disaster Response
❖Population validation for the POC dengue kits
❖Pilot testing of TB MDR, Influenza
❖Field test of clean water technology
❖Public Launching of nutraceuticals
❖Identification of lead compounds from natural products for statins and anti platelet
❖Launching of Database for Pharmacogenomics
❖Invite proposals for all projects in Vaccine, Drugs, Natural Products, Nutraceuticals, Diagnostics, Bioinformatics and Disaster Response.
❖Collection of data for biosurveillance
❖Initiate biomarker development for CVDs and cancer
❖Nutraceuticals for diabetes and CVD, pilot tested
2012
2013
2014
2015
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2018
BIOTECHNOLOGY R&D ROADMAP

Support for Research and Development

PCIEERD remained with its endeavor to implement programs and projects that are aligned to the DOST's priority programs namely, (1) Addressing National Problems, (2) Country Side Development and Inclusive Growth, (3) Increase Industry Competitiveness, (4) Improved Delivery of Government Services and (5) Harnessing Enabling Technologies. As DOST's lead agency in the industry, energy and emerging technology sectors, PCIEERD marshaled its resources to foster research and innovation in its priority areas/sectors. In 2012, PCIEERD supported and monitored projects that respond to the DOST's priority programs.

I. ADDRESSING PRESSING NATIONAL PROBLEMS

PCIEERD supported various R&D projects that would address problems on country's socio-economic vulnerabilities to disasters, enhance government's capability to deal with environmental and other hazards, increase country's level of energy self-sufficiency as well as improve mass transport system.

Disaster Risk Reduction and Management, Climate Change and the Environment

Program: Integrative Data Archiving for Disaster Risk Management

*National Institute of Geological Sciences, University of the Philippines Diliman

A data archive was developed to enable researchers to have access to disaster risk management and related information. The database contains geologic, tectonic, geohazards and meteorological information at the various scales available from the archives of the National Institute of Geological Sciences at the University of the Philippines Diliman.

Project 1: Tephrochronologic Studies of the Bicol Arc and Western Philippine Basin

The project identified large explosive eruptions that affected the Bicol Region and Western Pacific Basin for the last 1 million years by examining tephra deposits in marine and land environments.

Project 2: Tracing the Eastern Philippine Arc Evolution From Marine and Terrestrial

The project studied the geochemistry and geochemical correlations of the volcanic products in the Bicol Region to study the magmatic evolution of volcano.

Project 3: Influence of Large Explosive Eruptions on Primary Productivity of Philippine Waters (Pacific and Internal Seas)

The project determined the impact of large – scale volcanism to the marine environment specifically in terms of primary productivity, food base for all marine organisms.

Development of Combined Water Hyacinth Chopper-Harvester

Central Bicol State University of Agriculture

Efficient and low-cost equipment was developed to chop and collect the water hyacinth in waterways that will lessen water hyacinth growth, thus prevent negative impact like possible flooding in an area.

Establishment of the Flood Information Network (FloodNET)

*National Institute of Geological Sciences, University of the Philippines Diliman

FloodNET is envisioned to be a network of databases and software that automatically interpret data in terms of flood potential. Two sets of data exist: baseline information and real-time precipitation/water level information. The former includes watershed characteristics (size, shape, slope land cover etc.) rainfall-runoff information (from historical data) and locations of communities.

Development of a Low-Cost and Locally Designed Meteorological Buoy (MetBuoy)

*DOST- Advanced Science and Technology Institute

Moored meteorological buoys will be developed and deployed to monitor real time weather disturbances at sea. Instead of using expensive imported system, a localized buoy system is proposed to be developed to lower the cost of establishing an effective meteorological buoy system in the Philippines. The project is a joint undertaking between ASTI, MIRDC and DOST-Project Management and Engineering Design Services Office (PMEDSO).

Prototype of the Metbuoy System developed by DOST-ASTI.

Establishment of Doppler Weather Radar Network to Support Sustainable Socio-Economic Development in Mindanao

*DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Doppler weather radar network will be established in Mindanao for weather monitoring, prediction and forecasting. The Doppler radar systems shall provide real-time data and information to support early warning of weather related hazards for the benefit of the transportation (land, aviation and marine) and communication, agriculture and fisheries sectors as well as decision makers and community planners among others. The Doppler Radar stations are located in Hinatuan, Surigao del Sur and Tampakan, South Cotabato.

Enhancement of Weather and Climate Monitoring for Disaster Prevention and Mitigation in Visayas Regions (Cebu Doppler Radar Project)

*DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

PAGASA's early warning systems and facilities will be upgraded through the project. Further, PAGASA's weather, flood and typhoon forecasting and warning, climate prediction and information services for natural disaster preparedness and mitigation are hoped to be improved with the project. Particularly, the project is aimed at enhancing the Meteorological-Hydrological services of the Cebu PAGASA Regional Office with the upgrading of weather monitoring network and forecasting system to provide real-time data.

Geophysical Characterization of an Overriding Plate: Arc-Continent Convergence and its Implications for Natural Hazards and Resource Distribution in the Central Philippines

*National Institute of Geological Sciences, University of the Philippines Diliman

The project will characterize the effects of fast plane motions of the Central Philippine overriding plate segment on the geophysical character of the different lithologic units in the Central Philippines. Further, regional gravity and magnetic surveys will be conducted to delineate the different geologic terrenes, particularly their boundaries (i.e faults and shear zones). These potential field techniques can image the lateral extent of large scale tectonic (both structural and lithologic) features associated with the arc-continent collision in the region.

Linking Active Margin Tectonics and Overriding Plate Dynamics: A Look at the Geochemical Nature of the Central Philippines

*National Institute of Geological Sciences, University of the Philippines Diliman

This project is expected to generate an updated geologic, petrologic and geochemical data pool on the ultramafic and mafic rocks that make up the central segment of

the Philippine overriding plate as represented by the islands of Masbate, Samar and Negros islands. Together with the results of three other complementing studies included in this program, it is hoped that the region's tectono-magmatic history can be deciphered to explain the structural rotations and resulting distributions of magmatic and mineralized zones

Development of Geospatial Analysis Tools for Catchment Runoff Responses to Extreme Rainfall Events and Applications for Disaster and Environmental Management

*Training Center for Advanced Geodesy and Photogrammetry,
University of the Philippines Diliman

All relevant spatial data will be collected covering the watershed area, and if necessary, digitize the data in a GIS-ready format. Data include soil maps, spot elevation points or benchmarks and records of rainfall around area, if available. The ASTER DEM data shall be calibrated with respect to digital spot elevation data. Land cover of the study area shall be gathered from processed remotely-sensed data and shall be validated using ground data. Soil sampling shall be done to determine the hydraulic characteristics of soil, particular to the determination of surface infiltration.

Retracing the Central Philippine Overriding Plate Motion

*Training Center for Advanced Geodesy and Photogrammetry,
University of the Philippines Diliman

Plate movement above subduction zones is enigmatic and no individual parameter has been able to account for overriding plate deformation. In the Philippines, these issues are complicated by the compounded effects of two bounding convergent systems and a young, but extensive strike-slip fault zone. A clear understanding of the region's geodynamic history is a necessary element in constructing comprehensive land use plans, geohazard susceptibility assessments and mineralization potential maps.

The Geology of an Overriding Plate: Constraints from Field Geology, Sediment Geochemistry and Paleontology

*National Institute of Geological Sciences,
University of the Philippines Diliman

The project will decipher the geologic evolution of the Masbate, Samar and Negros Islands. Specifically it will conduct geologic field, sediment geochemical and paleontological investigations in target areas in each island. The results of this study will also comprise the primary framework of geohazard evolution.

Satellite and Field Detection and Analysis of Ground Subsidence in KAMANAVA, Metro Manila and other Coastal Areas such as Hagonoy and Obando, Bulacan

*National Institute of Geological Sciences,
University of the Philippines Diliman

The study revealed that ground subsidence rates are up to 5.5 to 6 centimeters per year and are highest in Marilao, Meycauayan and Caloocan. Specific critical areas identified are:
1) Guiguinto 2) Bocaue-Marilao 3) Meycauayan-North Caloocan 4) Navotas-Caloocan-West Quezon City 5) Makati-Mandaluyong-Pasig-Pateros 6) Parañaque-Pasay 7) Las Piñas-Muntinlupa and 8) Dasmariñas, Cavite.

The study laid out initial recommendations that were transmitted to the Department of Public Works and Highways (DPWH). This could guide future planning and management of concerned agencies like DPWH and the National Water Resources Board (NWRB):

Immediate development of alternative sources of water such as those drawn from rivers or lakes should be prioritized. A shift from groundwater to surface water from the Metropolitan Waterworks and Sewerage System (MWSS) and its concessionaires will give the ailing aquifers time to replenish. Artificial recharging with water from Laguna de Bay and excess surface water flows from Angat Dam could also help.

Careful assessment of new applications for groundwater permits, enforcing design standards for new wells, submission of well data, identification of illegal wells and calculation of the groundwater budget are essential.

Strict enforcement of groundwater extraction laws specifically the Water Code of the Philippines is crucial.

Careful design and planning of dike development are vital to protect the critical areas from seawater intrusion and eventual flooding.

Program: Disaster Risk Management Using Sensor Network & Computing: Early Warning System for Landslide, Slopes & Debris Flow Program

Project 1: Dynaslope -Development of a Dynamical Models for Landslide, Slope Failures and Debris Flow

*Institute of Civil Engineering,
University of the Philippines Diliman

This research project aims to develop a method for landslide forecasting by extending the observational method widely used in geotechnical engineering. Two key components of this approach are predictive model for calculating observational parameters in the field, and a monitoring system for measuring observational parameters, and iteratively refining predictions made by the model.

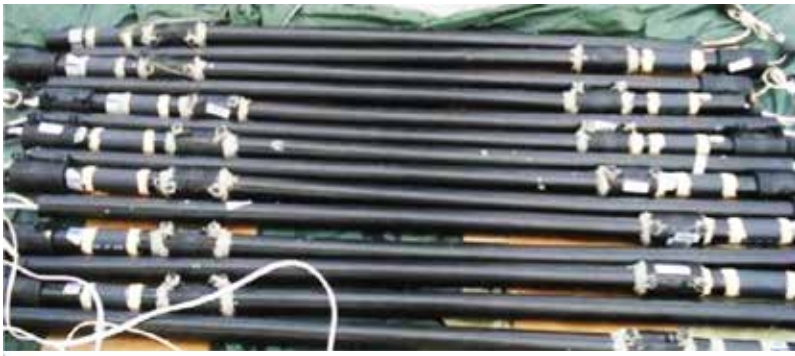
Project 2: Senslope - Development of Alternative Cost-effective Instrumentation and Sensor Networks

*Electronics and Electrical Engineering Institute,
University of the Philippines Diliman

The project involves the development of more cost-effective conventional instrumentation for landslide monitoring and the development of a novel approach utilizing low-power wireless sensor networks (WSN) and the necessary software algorithms for networking.

The first component attempts to locally develop instrumentation that may be used in conventional borehole assemblies, such as inclinometers and extensometers. These may be fabricated using low-cost accelerometers, strain gauges and system-on-chips (SoCs) as an alternative to wholly importing such instruments.
The second component involves the development of calibrated and cost-effective wireless sensor network

A team of researchers from the Institute of Electrical and Electronics Engineering of the University of the Philippines Diliman deployed sensors in Sitio Sinipsip, Brgy. Amgaleyguey, Buguias, Benguet



(WSN) implementation for monitoring of landslide and slope failures; calibrated, cost-effective alternative implementations of expensive inclinometers, extensometers and associated apparatus for monitoring landslides and slope failures; and a digital logging system for building a real-time monitoring system.

Environment

Performance and Safety Assessment of the Co-Location of the Near Surface Radioactive Waste Disposal Facilities and Borehole Disposal Concept in the Philippines

*DOST-Philippine Nuclear Research Institute (PNRI)

The long term safety of a surface repository was assessed by studying favorable site characteristics, engineered design structures, appropriate form and content of waste, operating procedures and institutional controls. Further, the disposal system will be established to isolate the waste from the accessible environment; to control releases of radionuclides that reach the accessible environment; and (3) to reduce the consequences of any unacceptable releases to the accessible environment.

Water Purification System: Production and Field/ Performance Testing of Ceramic Pot Filter

*DOST-Industrial Technology Development Institute (ITDI)

A total of 100 pieces of prototype ceramic water pot filter with anti – microbial coating was produced that could filter 6 liters of water. To test their performance, sample units of the ceramic water pot filter were distributed to beneficiaries of the National Housing Authority at Muntinlupa City. The tests showed good results in microbiological analysis before and after filtration following the protocol for washing the pot filters every three (3) days. The proposed selling price for a fabricated 20-L capacity ceramic pot filter with anti – microbial coating is Four Hundred Pesos (P 400.00).

Screening and Identification of Biofilm Formers as Potential Microbial Remediators for Heavy Metal Contaminated Wastewater

*University of the Philippines Los Baños

Biofilm formers were screened and identified as potential microbial remediators for heavy metal contaminated wastewater. The biofilm formers were characterized and identified using commercially available kits.

Bettermine Program

Project 1. Development of PE Nanofiber Membrane with Modified Nanoclay for Wastewater Treatment

*University of the Philippines Diliman

The research developed an adsorbent material that utilizes indigenous materials to treat wastewater contaminated with arsenic. Arsenic is typically associated with copper minerals that are mined in our country and arsenic is one of the most toxic heavy metal that is hazardous to life.

The adsorbent material is nanocomposite membrane containing dispersed iron-modified nanoclay that is technically known as montmorillonite (MMT). By incorporating iron, as a ferric ion (Fe3+) or as a zero valent iron (Feo), removal of arsenic from water was significantly improved at a rate between 80 to 99% removal when treating synthetically prepared arsenic-contaminated water.

Further, the nanocomposite membrane was produced using a biodegradable polymer matrix so that disposal of the composite at the end of its useful life will not be a problem.

Project 2. Development and Testing of Coco Peat Filter Bed for Treatment of Heavy Metals

*University of the Philippines Diliman

This project investigated the use of coco-peat as a sorbent material for the removal of heavy metals from mining wastewater to be used by small-scale gold miners. Experiments using batch and column tests were conducted to investigate the mechanisms involved

in the sorption of heavy metal ions such as cadmium, lead, arsenic and mercury. A reactor using coco-peat as filter material was also set-up in the field to treat the wastewater from a small scale gold miner in Paracale, Camarines Norte.

Project 3. Copper Flotation Technology for Small-Scale Mining Industry

*University of the Philippines Diliman

A simplified process of recovering the minerals and applying an integrated preventive environmental strategy will be developed. This is to address the valuable copper minerals together with the solid wastes that are dumped in vacant lots of evacuated tunnels, especially in small-scale mining communities.

Project 4: Alternative Method to Cyanidation and Amalgamation for the Recovery of Gold

*Department of Mining, Metallurgy and Materials Engineering, University of the Philippines Diliman

An alternative process of extracting gold from ores will be developed using flotation/gravity concentration technologies. With the application of said technology, it will small-scale miners to conduct recovery activities at the lowest capital and operational expenditure. The alternative processes of flotation and gravity concentration are emerging as the “greener” technologies that can be optimized to recover gold at higher efficiencies.

Project 5: Development of Philippine Montmorillonite Purification Technique for Nanocomposite Application

*University of the Philippines Diliman and Ateneo de Manila University

A purification method will be developed to optimize and obtain polymer grade montmorillonite from the raw material sources available in the country and utilize this in the preparation of nanocomposite material.

Project 6. Life Cycle Analysis for Small-Scale Production Systems: The Case of Gold

*University of the Philippines Diliman

A simplified technique was developed to analyze, design, redesign or improve small scale mineral production systems specifically for gold. Through the study, a more economical and ecological approach is developed to prevent or minimize wastes and pollution along the entire production and material flow of the small scale mineral production system.

Project 7. Assessing Biosorption Performance of E. Crassipes and Other Aquatic Plants in Cleaning Mine Tailings

*Ateneo De Manila University

Sargassum sp. Collected from coastal region of General Nakar, Quezon

Brown seaweeds (Turbinaria ornate, Sargassum sp.,) and roots of water hyacinth (E. crassipes) was established to be good biosorbents. It showed that all the dried biomass from the plants have high adsorption capacity for Cadmium (Cd), Lead (Pb), and Copper (Cu).

Further, with the use of Fourier Transform Infrared (FTIR) Spectroscopy, it showed that the functional groups such as hydroxyls and carboxyls are the functional groups are responsible for the biosorption of heavy metals in the three plant species.

Innovations on adsorption and recovery of the metal using the biosorbents was set up for potential application to clean up tailings waste of small scale miners.

High Grade Ceramics Development Utilizing Kaolinite Clay Deposits From Ilocos Norte Province

*Mariano Marcos State University

A novel technology was developed for the fabrication of porous & permeable mullite-based ceramic that has potential use in filtration systems such as water purification. Kaolinite clay minerals from domestic deposits particularly in Ilocos Norte was utilized to develop a high-grade reusable ceramic material for nano-porous ceramic applications.

A novel technology was developed by a team of researchers at the Mariano Marcos State University for the fabrication of porous & permeable mullite-based ceramic that has potential use in filtration systems such as water purification.

Green Technology and Active Community Engagement (Green ACE) Model Towards Estero de Paco Revival Program

*University of the Philippines Diliman

Project 1. Hydraulic Characterization of Estero de Paco

The project aims to set up a model for the Hydraulic and Hydrologic Characterization of Estero de Paco to be able to develop remediation technologies.

Project 2. Dissolved Oxygen Modelling for Estero de Paco

Information on water quality characteristics of Estero de Paco will be gathered. The collected data, as well as historical data will be used to develop a mathematical model for prediction of water quality in the estero. Said model will be useful in designing future rehabilitation efforts in Estero de Paco.

Project 3. In-Situ Remediation of Estero de Paco by Local Biominerals

An alternative technology on water remediation will be developed through the application of local, abundant, economical, environment-beneficial and natural material. This project can also lay down the real time and in-situ application of boiminerals as a viable technique for the bio-remediation of Estero de Paco, and hopefully leads to the development of an economic, sustainable and replicable bioremediation technique for esturies, lakes and rivers.

Copper and Arsenic Recovery as a Post Mining Activity Using Indigenous Plant Hyperaccumulators

*Ateneo de Manila University

The project is focused on identifying indigenous plant materials that are capable of hyperaccumulation of Copper (Cu) and Arsenic (As) collected from scale miners and mining companies in Benguet and Surigao. The physiology of hyperaccumulators will be analyzed to understand their ability to concentrate significant amounts of the metal including their requirements for propagation in the nurseries and in the field.

Metal Bio-indicator Plant Species of the Philippines

*De La Salle University

The study aims to complement on-going studies on ultramafic soil environments and hyper accumulator plant species particularly in Benguet, Kalinga, Albay, Cebu, Negros, and Compostela Valley. These sites represent phytogeographic regions in the Philippines. The six study sites were selected to capture taxonomic information on the flora that represents three of the six magmatic arcs and five of the fifteen biogeographic regions of the Philippine Archipelago namely the Luzon Central Cordillera Arc, Masbate-Negros Arc, Philippine Arc; and the Biogeographic Regions of Cordillera, Northern and Southern Luzon, Western Visayas, Central Visayas and Mindanao.

Conservation of Native Metallophytes, Phytochemistry of Nickel Hyperaccumulators and Phytostabilization to Restore Mined-out Areas in Palawan, Surigao, and Zambales

*University of the Philippines Los Baños

The proposed project consists of three components. Component 1 will be on "conservation biology of the native hyperaccumulators" that aims to conduct extensive geobotanical exploration in the three major ultramafic forests in the Philippines; to discover more hyperaccumulators; toidentify component biodiversity; to refine vegetative propagation protocols of native metallophytes, and establish living collection in situ and in UPLB; to identify associated mycorrhiza and bacteria within the rhizosphere (root zone); and to identify associated insects, and pathogens. On the other hand, Component 2 will identify the various plant metabolites involved in the uptake and sequestration of nickel as well as discover new biologically active compounds. Component 3 will focus on pilot testing of phytostabilization technology and ecological restoration using native metallophytes.

Application of Isotopic and Geochemical Techniques to Uncover Point and Nonpoint Sources of Organic Nutrient Contamination in the Neritic Zone of Boracay Island

*DOST-Philippine Nuclear Research Institute

This project aims to uncover point and nonpoint sources of nutrient contamination in the neritic zone of Boracay Island. The scope of the project includes and is limited to water/sediment/biota sample collection, field data measurement, isotope analysis, water quality (chemical and microbiological) determination, and modeling of spatial and temporal processes to track down the sources of nutrient contamination in the neritic zone of Boracay Island. An assessment of the effects of nutrient fluxes on the coralline system in the area will also be undertaken.

Use of Microbial Biofilms for the Rehabilitation of Heavy Metal Contaminated Wastewater

*Institute of Biological Science,
University of the Philippines Los Banos

Immobilized effective microorganisms will be used as biofilms to clean up wastewater from the industry partner semiconductor company.

Establishing the History of the Philippine Island Arc System: Clues from the Rocks of the Zambales-Pangasinan Region

*National Institute of Geological Sciences,
University of the Philippines Diliman

The geochemical and geophysical signatures of rocks in West Central Luzon will be determined in order to identify its tectonic evolution and mineralization potential.

Establishment of Baseline Sedimentation Rates During Extreme Rainfall Events: Pasig River Basin

*National Institute of Geological Sciences,
University of the Philippines Diliman

A scientific and technical monitoring tool will be developed for the development and maintenance activities in the Pasig River Basin. Results from study will be used to come up with policy recommendations that can be applied in evaluating related projects.

Energy

Solar Fluid Heating System Dish Development for Drinking Water Project

*Confederation of Scientific and Professional Organization - Region 7 (COSPO 7)

The solar powered fluid heating system for drinking water was developed using a mirror-film parabolic dish with a solar tracking device. The system developed serves as a cost and energy saving device for heating water among island communities.

Solar fluid heating system dish was developed to serve as a cost and energy saving device for heating water among island communities.

Capacity Building on Methane Emissions Recovery and Utilization from Landfills in the Philippines

*DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development

Capacity building development on landfill gas utilization as an alternative indigenous energy source in the Philippines is the focus of the project. Further, it will also identify the largest relevant emission estimates that will be useful in developing country-wide plans, landfill methane reduction programs.

The project is in line with the goals of the Methane to Markets Partnership, which is to promote the cost-effectiveness, near-term methane recovery and use as a clean energy source with the end in view of enhancing economic growth, promoting energy security, improving the environment and reducing greenhouse gas emissions.

Participants of the forum toured a biomass power plant in San Pedro, Laguna, which is operated by Bacavalley Energy, Inc.

PCIEERD organized a Seminar on Global Methane Initiative and Philippine Landfill Gas Forum last February 21-23, 2012.

Development of a Permanent Magnet Generator for Variable - Speed Wind Turbine System

*Electrical and Electronics Engineering Institute,
University of the Philippines Diliman

A locally designed and engineered permanent magnet generator for wind applications will be developed. Particularly, the project will design and develop a 2kW permanent magnet generator for a wind power system. The generator will be used for variable speed turbine system in tandem with power electronics systems for interface to the grid.

Development of Wind Turbine Emulator

*Electrical and Electronics Engineering Institute,
University of the Philippines Diliman

A wind emulator system will be developed that can be used in testing the performance of a wind generator system without the actual wind turbine. In particular, the emulator will be used to test the performance of a permanent magnet generator and the power electronic components included in the Wind Power System Program. Results to be generated from the project will be useful to the government or private company that intends to pursue a turbine testing facility.

Power Electronics for Wind Power System

*Electrical and Electronics Engineering Institute,
University of the Philippines Diliman

A permanent magnet generator for wind power system will be designed and developed. The power electronics will allow direct connection of the generator to the electrical grid even at varying wind power.

Development of a Prototype Automated Guide-way Transit (AGT) System

*DOST-Metals Industry Research and Development Center

An alternative and economical transit system model will be developed at the Science Community Complex for technology demonstration. It is hoped that this transit model system will be adopted in other urban areas to lessen environmental emissions and problems on public transport.

Development of Customized Local Road Vehicle (CLRV) Standards

*DOST- Philippine Council for Industry,
Energy and Emerging Technology Research and Development

The overall objective of this project is to modernize the customized local road vehicle fleet with focus on the utility vehicle category through the development and implementation of standards on vehicle and parts to ensure an environment-friendly and roadworthy motor vehicle fleet.

II. TAPPING NATURAL RESOURCES FOR COUNTRYSIDE DEVELOPMENT

With the end goal of creating opportunities and enhancing productivity in the countryside, PCIEERD supported programs and projects that explores other/alternative sources of materials for production of value-added products, strengthen and upgrade facilities in the region as well as improveand scale-up production of local products.

Sago Program

Program: Utilization / Conversion of Sago Starch Into Value-Added Products: Ethanol and Lactic Acid

*University of the Philippines Mindanao

Project 1 : Ethanol Fermentation of Sago Starch Using Raw-Starch-Digesting Amylases: Strategies for Ethanol Production Without the Costly Starch Pretreatment

The project was able to show that both Saccharomycopsis fibuligera 2074 and Saccharomycopsis bubodii 2066 have better growth pattern with the use of the 2-L fermentor as compared to the traditional flask-setup. Hence, although optimization studies for enzyme production were done during the Phase 1 of the Sago Biotech Program, those conditions were improved in the current project.

Project 2: Direct Lactic Acid Fermentation of Sago Starch without the Costly Starch Pre-treatment using Enterococcus faecium DMF78: Pilot Scale Costing

The study aims to verify in larger-scale, 30L and later in the 300L fermentator the capability of the microorganism, Enterococcus faecium DMF78, in retaining its productivity, efficiency and optical purity, which had been reported in the lab scale. In the pilot scale, with the above parameters proven and data for recovery taken, a fair costing can be done.

Program 2: Sago Bioresource Assessment for Sustainable Industry Utilization Using Remote Sensing, Geospatial and Suitability Analysis

Project 2.1. GIS-assisted Assessment on the Potential Yield and Bioresource Availability of Sago in the Wild for Sustainable Industry Utilization

University of the Philippines Mindanao

The project aims to assess the current and future potential yield and availability of sago stands in the wild for a sustainable sago starch-based industry.
In 2012, the project conducted field validation and assessment of natural sago stands in Nueva Era, Mambalili, Liloan, and Cabanbanan of Bunawan, Nueva Gracia of Loreto, Don Mateo of Veruela, Novele of Rosario, Salvacion of Prosperidad, Desamparados of Talacogon, Comota of La Paz, Bukidnon, Butuan, Cebu and Aklan.

Volume at different stages of growth of sago palms in the mapped sago areas in Agusan del Sur was determined. Digital analysis of mapped sago sites using Geographic Information System (GIS) provided the size of sago areas

and the volume of sago palms at different stages of growth. Further analysis will be made to determine the current and future harvests at specific time interval.

Project 2.2: Biophysical, Structural and Spectral Characterization of Sago and Its Environmental Conditions

*Caraga State University

The project conducted field data collection on biophysical and climatological factors, structural and spectral characteristics of sago stands and other palm trees. Field data collections were done in the provinces of Agusan del Norte, Agusan del Sur and and Surigao del Sur. Outcome of the project shall be used by to produce maps of sago stands.

Project 2.3. Mapping Sago Habitats and Sago Suitable Sites Using Optical and Radar Image Analysis and Suitability Relationships

*Training Center for Applied Geodesy and Photogrammetry, University of the Philippines Diliman

Researchers from the UP Diliman Training Center Training Center for Applied Geodesy and Photogrammetry conducted sago stands perimeter surveys in Butuan City, Agusan del Norte.

The presence and extent of distribution of natural sago stands in the Visayas and other parts of Mindanao will be studied. In 2012, maps of sago stands were generated for the provinces of Agusan del Norte, Agusan del Sur and and Surigao del Sur.

Flour Production from Sago for Food and Nonfood Use

*University of the Philippines Mindanao

The team of researchers from UP Mindanao conducted an initial test run on mechanized chipper-dryer for sago flour production. Further, an initial chemical and microbiological analyses and shelf life studies on sago flour had been conducted. Several food items from sago flour have already been produced.

Enhancement of Biotechnology Products and Services for Agro-Industrial Applications Program

*National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Banos

Subprogram 1: Large-Scale Production and Application of Enzymes for Food and Feed Applications

Project 1: Validation of Scale-Up Production of Microbial Rennet

Local cheese producers including the local dairy cooperatives, private cheese producers and multinational companies use about 37 metric tons of rennet to process milk into cheese. At present, BIOTECH is producing about 20 liters of liquid and 10 kg granulated form rennet per month. Target capacity is 350 liters and 350 kg/month.

Hence, this research will upgrade the production capacity for microbial rennet to meet projected demand. Particularly, it will look at important aspects such as quality assurance; use of rennet in different types other than white cheese, and as a functional ingredient; and use of fermentation by-product (biomass) as feed supplement for dairy animals and fish.

Project 2: Pilot-Scale Production of BIOTECH Cellulase and Alpha-Amylase for the Food, Feed and Other Industries

Cellulase has commercial applications in biomass conversion, textile desizing, detergent, food, and animal feed industries. As feed additive, the cellulolytic materials from wheat or barley are converted into more metabolizable forms of energy for animal feed. Glucose

generated from the enzymatic digestion of cellulose can be used in producing single cell protein as food for livestock or even humans. It is also used as starting material to produce a wide variety of chemicals and fuels.

This project will conduct optimized pilot-scale enzyme production using BIOTECH's upgraded pilot plant equipment. Storage shelf-life and enzyme kinetics of BIOTECH produced cellulase and alpha-amylase will also be conducted.

Project 3: Establishment of Bioprocess Systems for the Production of Pili Pulp Oil and Protein Enriched Residue for the Food and Feed Industries

A biotechnological method for extracting pulp oil was developed at BIOTECH, which uses enzyme rather than the toxic organic solvents. The principle of the enzymatic aqueous extraction is based on the mechanical and enzymatic degradation of the cell wall of the oil containing material, freeing the oil. A protein enrichment production system was also established by using solid substrate fermentation at pilot-scale level.

The pili pulp oil may make it attractive to the nutraceutical industry because of the presence of minor components such as carotenoids, tocopherols and sterols which shows a good lipid profile.

Subprogram 2: Scale-up Production of Probiotics for Food and Feed Applications

Project 1: Development of Probiotic Starter Cultures and Adoption of Technology for Functional Food

Probiotics are bacteria, generally lactobacilli or bifidobacteri, associated with a lot of health benefits ranging from alleviation of symptoms of lactose intolerance, treatment of diarrhea, serum cholesterol reduction and cancer suppression. Probiotics are usually used in fermented foods.

It has been established that it is necessary to have standardized starter cultures in order to have a fermentation product of consistently good quality. Because of the dearth of local supply of starter cultures, the local dairy industry has been importing the starter cultures for yoghurt and for the different types of cheese for their production. This project will focus in optimizing pilot scale production of starter cultures that were previously studied. It will help in producing starter cultures that are of interest to local entrepreneurs.

Project 2: Application of Probiotics for Fish and Prawn

Probiotics represent one of the most promising alternatives to antimicrobials developed in recent years to protect animal health and increase the efficiency of nutrient utilization. Aquaculture is developing and intensifying in most regions of the world in response to the increasing demand for aquatic food products. This has led to an increased use and misuse of drugs and chemicals in aquaculture resulting in food safety concerns. A technology for probiotic production had been developed at laboratory, pilot and commercial scale at the Feeds and Specialty Products Laboratory of UPLB-BIOTECH. This project will evaluate and test the probiotic products on aquatic animals, as follow-up to previous studies conducted on swine and poultry.

Subprogram 3: Improvement and Commercialization of Microbial-based Fertilizers and Plant Growth Promoters

Project 1: Improvement and Product Development of Microbial-Based Plant Growth Promoter

BioGroe™, a microbial-based plant growth promoter containing selected Plant growth promoter bacteria (PGPB), has been developed, packaged and tested in the propagation of crops and ornamentals by BIOTECH. The formulations were effective in growing vegetables, ornamentals, cassava, coffee, abaca and rubber.

A new BioGroe™ formulation will be developed and tested to withstand stress level conditions such as climate change effects. The previous formulations were tested from pot experiments or limited field trials under favorable conditions. It is necessary to develop microbial inoculants tolerant to these soil stresses in order to improve soil productivity. Production capacity shall increase from about 2,500 100-g packets to 234,000 packets per year.

Project 2: Large-Scale production, Improvement, Commercialization of NitroPlusTM Legume Inoculant

Rhizobial legume inoculants called NitroPlus™ can increase legume crop yields. In this project, an enhanced NitroPlus™ will be developed by using beneficial organisms as co-inoculants with capacity to increase nodule occupancy and affect symbiotic N fixation and solubilize phosphorus. Other activities include the packaging of the previously developed liquid form of NitroPlus™ and the field testing of its solid based form.

Project 3: Optimization and Scale up of Production of MykoPlus for the Biofertilizer and Bio-Organic Fertilizer Industries

A new product formulated with trade name of MykoPlus will be optimized as an efficient biofertilizer input for high value crops, ornamentals, fruit crops and forest trees. The optimization of Mykoplus is intended to solve the limitations of the Mykovam, a soil-based biofertilizer. Mykovam has a slow production system – normally taking five to six months for one production cycle.

DOST Management of Competencies: Enhancing Capacity for Industrial Applications of Gamma Column Scanning Technology

*DOST-Philippine Nuclear Research Institute

The project focuses on enhancing the capability of the PNRI to conduct gamma column scanning, a non-destructive and non-invasive tool for online diagnosis of process malfunctioning, optimization and predictive maintenance. The tool has the capability to provide rough estimations of froth heights, down-comer liquid level, tray flood, potential tray damage, and can depict operational profiles of transition sections and distributions inside the process levels. A pool of trained personnel on the gamma column scanning technique will be developed and an upgrade of PNRI's gamma scanning services and the laboratory-based demonstration column set-up will be undertaken.

DOST Management of Competencies: β-Cyclodextrin Inclusion Complex for Mosquito-Repellent Finishing of Cotton Fabrics

*DOST- Philippine Textile Research Institute

A surface-modified cotton and cotton-polyester fabrics will be developed with specific mosquito-repellent properties. Initial results on the current study on controlled-release system showed the feasibility of imparting added functionality such as fragrance-release on cotton fabrics. This study addresses the concerns on priority health issues of the country specifically on the perennial problem of Dengue Hemorrhagic Fever (DHF). Specifically, the surface of cotton and cotton-polyester (65/35) fabrics will be modified through grafting of β-cyclodextrin inclusion complex (Monochlorotriazinyl- β-cyclodextrin, MCT-β-CD) and subsequent treatment with natural oils for antimicrobials and fragrance-release finish. This development will form the string of technologies aimed at creating a new breed of high-end and customized textiles.

DOST Management of Competencies: Establishment of Processing Method for the Production of Natural Sweeteners from Nipa (Nipa Fruticans Wurmb.)

*Industrial Technology Development Institute (ITDI)

Processing methods appropriate for producing "natural" sweeteners from nipa sap will be developed. Study results may pave the way for commercial scale processing of nipa sap sugar in the regions.

Specifically, the project aims to optimize processing conditions for the production of natural sweeteners from nipa sap including the evaluation and improvement of collection and harvesting systems, screening of raw materials and the characterization of the products using the developed methods. The sensory and acceptability of the natural sweeteners will be profiled and compared to conventional sweeteners.

Establishment of Microbial Succession of Starter Culture for Rice Wine (Tapuy) Processing

*Food Science Cluster,
University of the Philippines Los Baños

A technology for the production of Philippine Rice Wine, also popularly known as Tapuy, will be developed. The project involves identification of novel microorganisms and development of starter culture specific for efficient rice wine processing. The end-product will be analyzed for physico-chemical, functional and sensory properties after refinement and aging processes to validate quality of the rice wine produced. The developed technology will enhance the export potential of our rice wine will.

Screening and Optimization of Conditions for the Local Production of Food Colorants from Microbial Cultures

*National Institute of Molecular Biology and Biotechnology,
University of the Philippines Los Baños

A number of natural pigments exist but only a few are available in sufficient quantities for industrial production. The advantage of producing pigments from microorganisms compared with other sources is that microorganisms can grow rapidly which may lead to high productivity of the product. This project will explore the production of organic colorants derived from locally available microorganisms. The technology generated will benefit the local food industry, in terms of value-adding on these aspects: a) pigment for foodstuffs b) nutritional supplement c) antioxidant content d) vitamin A precursors e) possible tumor-inhibiting activity.

Preliminary Studies on the Production of Laccase for Food and Wine Applications

*National Institute of Molecular Biology and Biotechnology,
University of the Philippines Los Baños

Laccase is an enzyme produced by fungi, plants, insects and other bacteria. Its function as an oxidizing agent for wide variety of organic and inorganic compounds makes the enzyme useful in several industrial applications such as: a) elimination of dissolved oxygen to improve quality of oils and food items b) elimination of undesirable phenolics that cause the browning, haze formation and turbidity development in fruit juice, beer and wine c) leavening of dough for baking d) bleaching of textiles, modification in the surface of fabrics and synthesis of dyes e) decolorization of effluents.

Under this project, preliminary studies will be done to explore local production of the enzymes. Currently, there are no studies done on the local production of this enzyme from microbial origin that can be used for efficacy studies. Economic analyses showed that local production of these enzymes is cheaper if not comparable to the imported enzymes.

Technological Support for the Upgrading of Local Cacao and Cocoa Industry

*DOST-Industrial Technology Development Institute

Project 1: Improving the Quality of Solid Cocoa Liquor Including Molded Cocoa Nibs and Developing the Capability of Small Scale Processors in the Manufacture of Intermediate Cocoa Products

Processing parameters appropriate for the production/ manufacture of solid cocoa liquor/molded cocoa nib (tablea) will be developed as raw material for intermediate cocoa products and chocolates. Further, the project will develop the capability of processors in the production of intermediate cocoa products by establishing the parameters for cocoa cake and cocoa butter including bulk chocolate, using the designed and fabricated equipment under this program. Also, the locally fabricated equipment will be used in setting parameters for the alkalization process, production of intermediate products and finalization of the GMP/HACCP guides.

Development of Neo-Ethnic Textiles Using Natural Fiber-Blended Yarns and Eco-Friendly Treatment and Dyeing Technologies

*DOST-Philippine Textile Research Institute

Ethnic textiles are fabrics distinctively produced by a certain tribe, community, locality or ethno-linguistic group that has become a part of its identity, culture and heritage. Although some of these fabrics have become prized items because of its novelty and the labor that

went with the weaving, most have only become staple for costumes and ordinary household items such as table runners and cloths. This project is oriented towards actively pushing these textiles to mainstream fashion in view of its eco-character and its novelty as representative of local textile heritage.

The use of natural and low-impact dyes, dyeing techniques to ensure reproducibility and safe handling, use of indigenous fibers instead of synthetic fibers, enzyme treatment technologies including fabric construction are some of the technologies that are targeted to be verified, fine-tuned, demonstrated and transferred to selected groups and partners. Ethnic designs include the "inabel" from Paoay, the "tiniri" from Abra and knitting from the Nooks Co. Ltd. Enzymatic treatment, dyeing and printing technologies using natural and low impact dyes will be applied to ethnic designs from "hinabol" from Bukidnon, "t'nalak" from South Cotabato, "hablon" from Iloilo and the "inaul" from Maguinadanao.

Development of Neo-Ethnic Textiles Using Natural Fiber-Blended Yarns and Eco-Friendly Treatment and Dyeing Technologies is a project of the DOST-PTRI being monitored by PCIEERD.

Isolation, Characterization and Preservation of Rumen Microbes Associated with Hydrolysis Intended for Cellulose Ethanol Production

*Philippine Carabao Center, Central Luzon State University

Carabaos are known for ingesting lignocellulosic feed and within their digestive system is a compartment called "rumen", where lignocellulosic materials like celluloses and other recalcitrant carbohydrates are broken down via anaerobic microbial fermentation.

The highlight of project accomplishment is the isolation, characterization, and preservation of potential microorganisms from the carabao rumen fluid responsible for degrading lignocelluloses into sugars. Study results may provide the needed technology to locally commercialize bioethanol production from lignocellulosic biomass.

Technology Needs and Industry Capacity Assessment for Philippine Tropical Fabrics (PTF) Thru the Value Chain Approach

*DOST-Philippine Textile Research Institute

The study validated the capacity of the local industry players to supply and produce Philippine Tropical Fabric (PTF). It revealed that only a strict compliance by all government agencies with regard to RA 9242 shall result to the emergence of a significant market for tropical fabrics. The inclusion of PTF in the government procurement system shall also facilitate its distribution and use.

Advocacy and Showcasing of Neo-Ethnic Textiles and Newly Developed Philippine Tropical Fabrics

*DOST-Philippine Textile Research Institute

This project validated the applicability of an enzyme finishing technology to new fibers with potential to become new Philippine Tropical Fabrics (PTF). It showcased newly-developed fabrics from water hyacinth, maguey and saluyot, blended in cotton, polyester and silk. These fabrics were the second set of PTFs launched to the industry; the first batch launched previously were abaca, piña and banana fibers blended in cotton and/or polyester.

The conglomeration of R&D milestones was highlighted during the fashion event "Bagong Habi... Salinlahi, Cutting-Edge Philippine Textiles" at the Grand Ballroom of the Intercontinental Hotel Manila on February, 08, 2012. The show and exhibits kicked off new creations of chic office uniforms, trendy apparels, casual dress, formal gowns and coats.

Commercial-Scale Validation of the Enzyme Finishing Technology for Philippine Tropical Fabrics (PTF)

*DOST-Philippine Textile Research Institute

This project validated the enzyme finishing technology for PTF and the acceptability of silk-based fabrics that are RA 9242 compliant at a commercial scale. Specifically, the study revealed that pineapple and abaca blended yarns and woven fabrics are suitable for apparels. The raw and degummed fibers were analyzed and found to have better spinning performance compared with established data on PTF. Results of the property testing showed that the fabric passed the minimum standard requirements for PTF and career dress apparel. Improved wearability was observed on the material which was attributed directly to the enzyme finishing technique used.

Decorticated pineapple fibers were sourced from Maguindanao and Camarines Norte while raw abaca fibers and raw silk came from trading firms. Pineapple and abaca fibers were pretreated at the DOST-PTRI Natural Fiber Pilot Plant using the developed technologies for each fiber.

III. MAKING INDUSTRIES COMPETITIVE

To make more industries more competitive, PCIEERD supported projects that introduce/explore new technologies that will improve products and services, establish and implement quality management system to meet global standards and build facilities that would address concerns of industries.

Food Industry

Stabilization of Rice Bran Using Microwave Volumetric Heating for Emulsion-Based Processed Meat

*University of the Philippines Diliman

A sample of rice bran

Rice bran is an under-utilized by-product of rice milling. It is currently more used as animal feed because it is highly susceptible to deteriorative rancidity. Through the project, it was able to able to stabilize rice bran (SRB) using microwave volumetric drying technology and incorporate it in the emulsion-based meat system at commercial-scale production of hotdogs. Further, the project came up with a competitive price for the SRB at PhP 64.14/kg. This price is much lower than the commercially-available imported bran which costs around PhP 90.00/kg.

Setting-up of Processing facilities for the Production of Flours Made from Root crops, Cereals, Legumes, and Vegetables

*DOST-Food and Nutrition Research Institute and DOST-Technology Resource Center

The project established a processing facility with locally fabricated semi-automatic flour processing lines specializing in the production of flours made from cassava, sweet potato, and squash. FNRI developed the technology in the production of flours from the said sources as well as bakery and pasta products utilizing these flours.

Development / Improvement of Transport Packaging Technology for Non-Food Products (House Decor and Furniture)

*DOST-Industrial Technology Development Institute

The project developed/improved the transport packaging technology (structure and cushion) and comply with existing international standards at minimum cost possible.

Commercial Scale Production of Cassava Grates and Flour in Bohol

*Visayas State University

It has been proven by the cooperator that cassava grates has a market in the locality and has a potential market for export as a result of the emerging trend in ethnic food worldwide. Promotion of cassava grates and flour for use in various bakery products in partial substitution to wheat flour may help address the challenge to bakeries and other manufacturers brought by the increasing market price of wheat flour. The potential of cassava flour also extends to individuals with adverse reactions to gluten in wheat such as those with celiac disease, gluten intolerance, and wheat allergy.

Enabling PhilRootcrops to commercialize the technology will pave the way for more and improved processing systems not only for cassava but also for other local crops which will be a great advantage to the farmers.

Design and Development of an Automated Hot Water Treatment for Mango

*Mariano Marcos State University

A functional continuous type automated hot water treatment for mango was developed by a team of researchers at MMSU. The machine has the following components:

- Feed conveyor table for receiving mangoes to be treated
- Hot water tank for treatment
- Conveyor bucket system for transporting mangoes under treatment
- Exit conveyor table for receiving treated mangoes and serves as drying area
- Blower for drying treated mangoes
- Driving system of the conveyors
- Digital controller with display for regulation of temperature and duration of immersion

The AHWT machine was found to be effective in reducing occurrence of anthracnose and stem-end-rot to 1% at 2 min. treatment at 58°C against 10-40% of the existing batch-type hot water treatment technologies (10 min. at 52°C, 5min. at 55°C, 1min. at 60°C). However, to lower the cost of treatment, the 1 min. immersion at 60°C can be used when disease density is low. The machine is capable of treating up to 1.4 tons mangoes per hour for 1 min. treatment at 60°C, or 726 kg for 2min. treatment at 58°C, 301kg for 5min. treatment at 55°C or 122 kg for 10min. treatment at 52°C.
The development cost of the AHWT machine is Php 432,386.60 that includes materials and labor costs.

Automated hot water treatment for mangoes was developed by a group of engineers from Mariano Marcos State University.

Phase 2: ISO/IEC 17043:2010 Accreditation as Proficiency Test (PT) Provider for Credibility Improvement and International Recognition of FNRI Proficiency Test Program – Year 2

*DOST-Food and Nutrition Research Institute

The project aims to improve the credibility and international recognition of FNRI organized PT's and developed Reference Materials (RM) on proximate and mineral/other nutrition labeling analyses through ISO/IEC 17043:2010 accreditation as PT provider.

Identification and Selection of Equipment Fabricators in Support of the Various DOST Programs

*DOST-Metals Industry Research and Development Center

A pool of reliable equipment fabricators that can produce equipment according to the desired specifications and efficiency will be provided for DOST and its attached agencies.

Field Testing of the Heat Pump Dryer and Cooler for Mangoes

*Mariano Marcos State University

The technology will provide a cheaper alternative to the use of liquefied petroleum gas (LPG) in the drying of commodities such as fruits. Field testing of the MMSU dryer can cater the drying and cooling needs of products being harvested in the university, the locality and the region as a whole. This will be an avenue wherein bulk of produce during the season can be hygienically dried and stored.

The heat pump dryer and cooler for mangoes developed by Engr. Samuel Franco of Mariano Marcos State University have been refurbished and improved, specifically the dehumidifier to suit the requirements of the mango cooperators

Enhancing the Competitive Identity of Philippine Products Through the Development of Packaging Design and Appropriate Packaging Technology

*DOST- Industrial Technology Development Institute

The project will focus on unique Philippine products that have direct impact on tradition, preserving the culture and tribe and which could have marketing opportunities in the export market. Further, it involves the development of packaging design and appropriate packaging technology to enhance the competitive identity of eight (8) unique Philippine products.

Strengthening the Testing and Analytical Capabilities of the Regional Laboratories to Support the Competitiveness of Local Industries (STARLABS)

Department of Science and Technology Regional Office IX

The project intends to strengthen the capacity and capability of DOST RSTLs in delivering relevant, timely, cost-effective and accurate analytical and testing service to address the testing needs of the MSMEs.

Identification and Selection of Equipment Fabricators in Support of the Various DOST Programs

*DOST-Metals Industry Research and Development Center

A pool of reliable equipment fabricators that can produce equipment according to the desired specifications and efficiency will be provided for DOST and its attached agencies.

Process Improvement and Waste Minimization in Chichacorn Manufacturing

*Mariano Marcos State University and Northwestern University

The project aims to develop an optimized process to produce chichacorn which is compliant with the specifications in the Philippine National Standard for chichacorn.

Development of Okara Powder as Fiber and Protein Ingredient

*University of the Philippines Diliman

A shelf-stable, value-added okara powder ingredient will be developed for the production of high fiber and high protein extruded snacks. Okara is the residue left during the processing of soybeans which is used to produce food products such as soymilk and tofu. In the Philippines, amongst the significant industries utilizing soybeans include tofu, taho, and soy milk processing industries.

A sample of Okara

Development of Alternative Drying Process for the Production of Stabilized Brown Rice for Commercialization

*DOST-Food and Nutrition Research Institute

The project will combine saturated steaming with other drying techniques to reduce processing time and make the technology commercially and technically feasible.

Utilization of Brown Rice in the Production of Potential Functional Food Products and Recipes

*DOST-Food and Nutrition Research Institute

Brown rice will be processed into products such as snack and bakery foods. Delicious recipes from brown rice will also be developed to tickle the appetite of children, discriminating adolescents and health-conscious adults. Science-based evidence showed that brown rice is not only more nutritious than white rice, it also has functional properties not present in its white counterpart, like cholesterol lowering effect, low glycemic index and higher satiety value. The utilization of brown rice is encouraged for two other reasons. First, the production of brown rice reduces the power demand needed in polishing and whitening by as much as 65%. Second, with the bran and the embryo intact and with fewer broken grains, whole grain milling recovery is as much as 10% higher than for white rice.

Innovation of the Process for the Production of Stabilized Brown Rice for Commercialization

*DOST-Food and Nutrition Research Institute

In the earlier study implemented by the FNRI-DOST, the shelf-life of brown rice was improved through a combination of steaming and force-draft drying. From the usual shelf-life of three months, the treated brown rice was able to retain sensory acceptability and quality for at least six months. However, the present heat treatment process required drying for more than one hour, hence, for large scale production, this may not be attractive for adoptors since energy consumption will be high.
This project aims to combine saturated with fluidized bed drying technique to reduce processing time and make the technology commercially feasible.

Continuing R&D Initiatives Program: S&T Based Solution towards Sustainable Strategy for Child Malnutrition: The First 1000 Days Window of Opportunity

*DOST-Food and Nutrition Research Institute

The project aims to evaluate and sustain a nutrition strategy to improve the nutritional status of young children and pregnant/lactating mothers.

Indigenous people, the Pala'wans, were the participants to the Complementary Feeding program at Brgy. Panitian, Quezon, Palawan.

Project 1. Evaluation of Quality Profile and Functional Properties of Makapuno(ECM and Kabuwig)

*DOST-Industrial Technology Development Institute

The project will determine and evaluate the quality profile and functional properties of Makapuno (ECM and Kabuwig). The quality profiles of Makapuno will be determined using Electro-Nose, Electronic Tongue, Gas Chromatography-Mass Spectrometry and Sensory Evaluation.

Project 2. Development of Frozen Makapuno as Intermediate Raw Material for Food Processing

*Batangas State University

The project aims to process Makapuno as intermediate raw material for food processing by subjecting the fresh Makapuno to blanching and blast freezing. The best time and temperature combination in processing frozen Makapuno will be determined.

Upgrading of the FPRDI Furniture Testing Center (FFTC) into "One-Stop-Shop" National Furniture Testing Center (NFTC) and Establishment of Satellite Furniture Testing Center (SFTC) in Cebu

*DOST- Forest Products Research and Development Institute

To serve the testing needs of the furniture industry, the project will establish a SFTC in Cebu and upgrade the FTC of FPRDI into "One-Stop-Shop" National Furniture Testing Center. The FTC services will be expanded by establishing its capabilities in flammability testing, UV exposure testing for garden and outdoor furniture, surface finish testing, lead content analysis as well as corrosion testing.

The DOST-FPRDI Furniture Testing Center aims to provide the testing needs of the furniture industry.

Technology Generation for the Production of the Multi-Nutrient Extruded Rice Kernel to Address Malnutrition

*DOST-Food and Nutrition Research Institute

The project aims to fortify rice by producing multi-nutrient extruded rice kernel to address micronutrient malnutrition in one vehicle using either hot extrusion and/or cold extrusion technology.

Development/ Improvement of Packaging Technology for Pork Lechon

*DOST-Industrial Technology Development Institute

The project aims to seek a new or improved packaging system and an effective packaging technology to maintain the quality and freshness of pork lechon that is shipped to far destinations locally and even abroad.

Development of Transport Packaging Technology for Cut Flowers

*DOST-Industrial Technology Development Institute

The project will focus on developing appropriate transport packaging technology that will reduce handling and distribution damage. It will also come up with a new design and brand name that will give a reputation for quality of cut flowers grown in the Philippines. The project directly targets individual farmers and group of farmers (cooperative) of cut flowers in the countryside.

Toxic Migrants in Packaged Foods and Beverages: Addressing the Safety Issues on Packaging Related Contaminants in Foods

*DOST-Industrial Technology Development Institute

The project results will provide the necessary information on the actual levels of contaminants in paper/boards and plastic packaged foods, the quality of packaging containers being used and the environmental factors affecting the dissolution or rates of migration of such contaminants.

Support to the Establishment and Implementation of the Quality Management System for the Metals and Engineering (M&E) Sector's Beneficiary Firms

*DOST-Metals Industry Research and Development Center

Selected eight (8) beneficiary firms of the M&E sector will be assisted in the establishment and implementation of a quality management system to be able to acquire ISO 9001:2008 certification. These firms are the following:

National Capital Region:	Supercast Foundry and Machinery Corp., Valenzuela City
Region IV-A:	K.E.A. Industrial Corp., Optitech Machine Tools and SWISCO
Region VII:	Pertian Industries Corporation and Proline Industries Metal Works & Engineering
Region XI:	Davao Beta Spring, Inc. and Deco Machine Shop, Inc.

Improved Mango Fruit Bagger and Picker

*Pangasinan State University

An efficient tool in bagging and picking of mango fruits will be developed to eliminate risks posed to farmers when harvesting mangoes. The project team already completed a survey on the mango production practices of mango growers in Pangasinan that served as reference in designing and fabricating a mango fruit bagger and picker suited to their needs. Initial testing of the mango fruit bagger was already conducted.

Shelf-life Extension of Fortified Ready-to-Drink Tropical Fruit and Vegetable Juice Blends Prepared by Aseptic Processing and Packaging

*University of the Philippines Diliman

The project will develop safe, nutritious and high-quality beverage products from indigenous fruits and vegetables in the Philippines. It also aims to optimize the parameters for (commercial) pilot scale aseptic processing of five formulated ready-to-drink (RTD) tropical fruit and vegetable juice blends fortified with vitamins A and C.

Electronics Industry

Chip Design for Engineering Research and Development for Technology (ERDT's) Semiconductor and Electronics Track Program

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

Project 1: Radio Frequency Complementary Metal-Oxide Semiconductor (RF CMOS) Design

RF Transceiver circuits was developed to be used as a major building block in developing a System on a Chip for Wireless Applications. Zero IF transceiver architecture further was investigated to be used in a WiMax Application. The 90 nanometer STMicroelectronics CMOS process will be used as the target of chip implementation.

Project 2: Analog and Mixed Signal Integrated Circuit (IC) Design

This project designed, implemented, simulated and characterized different analog and mixed - signal blocks using standard 90nm CMOS process.

Several op-amos and Operational Transconductance Amplifier (OTAs) were developed using a standard 90nm CMOS process. The application of programmable bias circuits in operational amplifiers had also been investigated to improve the op- amp's performance with process variability.

Further, an OTA with adjustable bias was designed as a building block to a Gm-C filter, which will be in a Worldwide Interoperability for Microwave Access (WIMAX) transceiver system. An ADC chip was also developed as a part of the target WIMAX system and was interfaced between the RF modules and the base band processor.

Project 3. Low Power RISC Design

Multi-core processors was designed using 90nm standard cells. During the first year of the project, the initial designs of the core and its bus configurations were implemented using industry-standard simulation tools.

However, several optimizations are still needed to be done to reach their optimum performance at low power consumption.

Digital Design and Interfacing for ERDT Semiconductor and Electronics Track Program

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman, Quezon City

Project 1: ASIC and System Level Design

In this research, application specific processors was designed and characterized. The top-down and bottom-up approaches for design was utilized. Further, the top-down design was used to define the different functional units of the system, and define the target specification of each block. The bottom-up approach was used during design, starting from the small functional blocks to the system-level design. Focus was given to applications on data compression and coding for transmission over communication channels. Incorporation of built-in-self test techniques was also studied.

Project 2: Interface Module Design

In this research, different types of interface modules, such as Universal Serial Bus (USB) 2.0, General Purpose Input/Output (GPIO) devices, and Inter-IC (I2C) bus was designed and implemented in Field Programmable Gate Array (FGPA) boards. This is essential to determine how industry-complaint modules can be developed in the laboratory. Also, IP modules were purchased for simulation, testing and comparison with the interface modules that were initially implemented. The results of the comparison were used to design and implement the final design of the modules that will be fabricated using the 90nm CMOS process. The resulting ICs was integrated with the SoCs to create a stand-alone system easy to interface with other systems.

Project 3: High Speed PCB Design

Signal-integrity and transmission-line simulation is a crucial part of high-speed digital design. Repairing signal-integrity and crosstalk problems before building high speed circuit design can eliminate unnecessary design tangents and improve design quality yield.

In this project, signal integrity issues in a memory used in microcomputer was investigated and analyzed by using signal integrity software suite. A reference memory module was implemented and fabricated. The implemented memory module's functionality was tested by plugging on a test microcomputer system. After the memory module implementation, a high-speed digital circuit system was analyzed. The high-speed circuit was implemented and fabricated.

Smart Wire Program

*University of the Philippines Diliman

Project 1: Energy Efficient Data Acquisition and Conditioning for the Smart Wire Sensor Node Project Wire

Energy efficient data acquisition and signal conditioning circuits will be developed for the Smart Wire sensor node. The circuits will be used to measure electric current and temperature information, as well as perform the necessary signal conditioning, allowing for energy efficient information transmission and storage. The main components of the data acquisition and signal conditioning subsystem are analog-to-digital converters (ADCs) and filters. In the context of the SmartWire, these circuits must be able to operate in an energy-limited and very noisy environment.

Project 2: Integrated Energy Harvesting, Storage and Regulation for the Smart Wire Sensor Node

Efficient and reliable energy harvesting circuit technologies will be developed for the SmartWire sensor node. The energy harvesting circuit must be able to harvest energy from the power lines and/or from ambient radio-frequency radiation, It should be able to supply a current of at east 50mA for the worst-case communication energy requirement, and operate in low power mode while on standby, making the average power consumed by the SmartWire sensor network negligible compared to the power of the grid. Two sources of ambient energy will be studied: the electromagnetic energy emitted by the power lines, and the ambient radio-frequency energy emitted by various radio sources.

Project 3. Energy Ultra-Low Power Computation and Communication for the Smart wire Sensor Node Project

The project will develop an ultra-low power communication and computation circuits and architectures for the SmartWire sensor node. The communication subsystem will provide the physical layer interface to the communication channel, and could either be the power line for power line communications, or free space for radio-frequency (RF) communications. The computation subsystem manages the operation of the whole SmartWire sensor node, including the protocol processing needed by the communication system, system- and circuit-level error correction and digital demodulation of the received signals. Both these subsystems must be able to operate at extremely low power levels and at with a supply voltage of 0.5V.

Establishment and Operation of Philippine Electronics Product Development Hub

*DOST - Advance Science and Technology Institute

A product development center will be set up that will house hardware and software tools and facilities that can be used by companies or schools to design develop and test hardware and software for electronics products for their intended applications. The program shall adjust to the industry requirements as the industry develops and grows.

Eye-C: Design of a Vision-capable Micro-controller IC for a Robot Explorer Program

*Electronics and Electrical Engineering Institute,
University of the Philippines Diliman

Project 1: Micro-controller Design for Micro-mouse Applications

An 8-bit microcontroller complete with necessary I/O peripherals was developed necessary for a micromouse application. A 0.25um CMOS process was used for the fabrication of the design.

Project 2: CCD interface with Color to Monochrome Image Conversion

The research developed a CCD Interface with color to monochrome conversion. Initial prototype was demonstrated on a FPGA connected to a CCD camera for image capture, and a monitor for display. The final design was fabricated targeting a 0.25um CMOS standard cell.

Project 3: An 18-bit Oversampling Audio Delta sigma D/A Converter Design.

This research designed and developed an 18-bit oversampling delta sigma digital-to-analog converter. Further, the sample developed will be used in Microelectronics applications particularly in developing an 18-bit input format sigma-delta fifth-order single stage D/A converter. The design used Verilog language, implemented and demonstrated with the use of XILINX Vertex 2-XC2V600 Kit boar, and finally fabricated using CMOS standard cells.

Project 4: Design of a High PSSR Two-Stage Operational Amplifier

A two-stage op-amp with a high power supply suppression ratio (PSSR) was developed. A 0.18um CMOS process was used to fabricate the design. The designed op-amp was used as a major component in the power management of the vision capable IC.

Innovation and Design for Manufacturability of Microwave and Millimeter-wave Radio Modules Through Industry Collaboration

*Electronics and Electrical Engineering Institute,
University of the Philippines Diliman

The project designed and manufactured circuits and modules for Microwave and Millimeter wave (between 6GHz) wireless communication systems. It targeted the local development and innovation of the passive and active blocks of these microwave and millimeter wave radios. Particularly, the project developed new, possible patentable, designs for the circuits and modules that comprise these ODUs.

This new intellectual property may eventually be at the heart of more competitive wireless communication system products from the Philippines and may help address country's dependence on foreign and imported technology in the booming area of wireless.

SoDeRa: Development of Software-Defined Radio Platforms and Techniques for Enabling Next Generation Wireless Communication Networks

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

Today, Software Defined Radios (SDR) provide the platform for the development of future wireless communication systems incorporating new architectures and techniques for modulation, coding and space-time processing that are implemented using software on a single, flexible hardware platform. One application of SDR is in spectrum agile radios, which have been termed Cognitive Radio (CR).

The project investigated new hardware architectures and signal processing techniques that result in further enhancing the reliability and throughput of these wireless systems. These outputs may lead to new intellectual property that is the basis of technology-based differentiators at the heart of next generation wireless communication devices.

In particular, the project developed new space-time signal processing methods, coding, modulation, detection, equalization and other receiver techniques that may be used in next generation wireless communication systems. These techniques were tested using simulation tolls to provide proof of concept and subsequently implemented in practical hardware, such as DSPs and FPGAs, with the intent of bringing SDR and CR closer to commercialization.

Versatile Instrument System for Science Education and Research (VISSER)

*National Institute of Physics, University of the Philippines Diliman

A system will be built centered around a handled micro controller-based universal platform. Using this as the "brain", many different sensors can be connected to it and controlled to perform experiments in various science fields. The transition from one experiment to another will be effortless since the units can be used in several experiments on various topics in a single day. It will fully integrate the hardware and software and will supplement by well-written, highly descriptive manuals that will facilitate individual learning.

RxBox2: Integrating Medical Devices in the National Tele-Health Service Program

Project 1: Integration of Commercial Biomedical Device Units with CHITS and eTriage

Project 2: Development of a Portable Industrial Grade Biomedical Diagnostic Device for Remote Maternal and Fetal Health Care Monitoring

Project 3: Field Deployment of Telemedicine Devices

*National Tele-Health Center, University of the Philippines Manila

The RxBox2 Program will develop locally manufactured, medical-grade telemedicine devices, and demonstrate its usefulness in target Rural Health Units (RHUs) / Local Health Centers in GIDA (Geographically Isolated and Disadvantaged Areas).

It will contain and integrate into a single biomedical device the same medical sensors in the original RxBox - blood pressure, heart rate, and dissolved oxygen – with the same goal of assisting the health staff posted in rural remote municipalities in their clinical decision making by urban-based clinical specialists.

RxBox2 will also measure and transmit physiologic signals on maternal uterine contraction, and fetal heart rate; maternal and child health services form the bulk of services of RHUs.

Capacity Building for Competitiveness of the Metals and Engineering Industry Cluster (CAIMTEC) of CAR for the Localization of Industrial and High-Precision Technology Parts

*DOST-Metals Industry Research and Development Center

Various capacity building activities will be conducted for the enhancement of the competency level of M&E enterprises in CAR. These activities will include technical trainings and consultancies, training-cum-production

activities, conduct of study mission/benchmarking, and the development of a computerized production planning and quality control system.

Development and Transfer of Appropriate Technology for Countryside Development

*DOST-Industrial Technology and Development Institute

A prototype sugar cane crusher and sharpening attachment will be developed. The prototype sugarcane crusher and knife will undergo functional testing to establish actual capacity. Prospective industry adaptors will also be trained on the use of said tool.

Development of Vacuum Oil Quench Heat Treatment Furnace (Year 2)

*DOST-Metals Industry Research and Development Center

MIRDC in cooperation with DOST's PMEDSO will develop a Vacuum Gas Quench System, which is intended to support the DOST HITS focused towards recognizing equipment needs that will enhance the performance and productivity.

Capability Development for CNC Machine Tool Refurbishment (Repair) Year 2

*DOST-Metals Industry Research and Development Center

Local capability on CNC machine tools repair will be developed further to improve productivity and competitiveness of domestic manufacturing firms.

Strengthening of Interregional S & T Cluster-based IDEA Teams,Phase II - Capability Building and Mobilization of Cluster-based IDEA Teams

*DOST-CARAGA (North Luzon, South Luzon, Visayas and Mindanao DOST Clusters)

The Inter-agency Design and Engineering Assessment (IDEA) Team was organized at the national level to provide support services and enhance the implementation of the Small Enterprise Technology-Upgrading Program (SET-UP).

Formulating the R & D Programs and HRD Plan of MIRDC Technology Roadmaps of the M & E Sector Through Technology and Training Needs Assessment

*DOST-Metals Industry Research and Development Center

Technology and training requirements of the metalworking industry will be determined, specifically the machining and fabrication, tool and die, and metalcasting sectors. Based on the technology and training needs report, an R&D program and Human Resource Development plan will be formulated in accordance with the MIRDC technology roadmaps for the identified sectors.

Development of a Micro Cupola for Foundry Research, Instructions and Small Novelty Item Casting Production

*DOST-Metals Industry Research and Development Center

The project will investigate the performance of the cupola including melt rate, melt temperature, campaign length on different commercially available refractories and the effects of oxygen enrichment. Promotion of cupola to the local foundries, universities and other interested groups through technology demonstration will also be conducted.

Design and Development of Process Equipment for Food Processing Firm (Year 2)

*DOST-ITDI, DOST-MIRDC and DOST-Project Management Engineering and Design Service Office (PMEDSO)

Local technologies will be developed that addresses the needs and problems of food processing industry/sector in the country.

Strengthening of DOST Regional Metrology Laboratory Services

*DOST Regions I, II, III, IV-A (CALABARZON), IV-B (MIMAROPA), V, VI, VII, VIII, IX, X, XI, XII, CAR and CARAGA

The project will upgrade the facilities and expand the scope of services of the DOST Regional Metrology Laboratories (RMLs) thereby sustaining the delivery of relevant, timely and quality services to priority industries in the regions.

Mining Industry

S&T Program for Responsible Mining in Mindanao

*Caraga State University

Subprogram 2: Biodiversity Assessment of Terrestrial and Aquatic Ecosystems in Selected Mining Environs in Mindanao

Project 1: Assessment of Terrestrial Biodiversity in the Selected Key Mining Areas of Mindanao

The biodiversity of terrestrial ecosystems will be assessed in key mining areas in Mindanao such as Claver Surigao Del Norte and Carrascal, Surigao Del Sur (large scale nickel mines); Bunawan and Rosario, Agusan Del Sur (small scale gold mines) Opol, Misamis Oriental (small scale gold), Alubihid Misamis Oriental (small scale nickel and chromite); Gango, Libona, Bukidnon (small scale gold); and T'boli and Bagumbayan of South Cotabato (small scale gold). The assessment of the biodiversity of the areas will enable a comprehensive profiling and analysis of terrestrial flora and fauna near key mining areas in comparison to relatively pristine conditions.

Project 2: Assessment of the Aquatic Biodiversity in Selected Mining Areas and Environs in Mindanao

Assessment and inventory of aquatic flora near these key mining areas will be one of the first biodiversity initiatives in aquatic systems in Mindanao. This will provide baseline record and insights on both freshwater and marine flora as well as possible impacts of mining to its diversity. It will also allow comparison of biodiversity indices of environs near Nickel mines that extract and ship nickel ores abroad for processing (Carrascal, Surigao del Sur) and environs near nickel mines that extract and process the nickel ores in the area itself (Claver, Surigao del Norte). This comparison will be very important in elucidating which of these practices for nickel pose threat to the biodiversity of its community.

Project 3: Monitoring, Assessment and Profiling of Artisanal and Small-scale Mining (MAP-ASM) in Key Areas in Mindanao

A repository of information will be developed through monitoring, assessment and analysis of mine operational practices done both by the operators and the local miners in the identified key areas in Mindanao. A mini-compendium and database as outputs will cater the current methods used to be collated, integrated, analyzed, synthesized, shared and published. The expected outputs will be useful in designing intervention for the improvement of mining, mineral processing, and marketing strategy involved in ASGM as part of a technology transfer.

One of the dams in Zamboanga del Norte is heavily affected by nickel mining.

Project 4: Contamination Pathway and Pollution Management of Mining in Mindanao

Information on the impact of mining on the quality of water and soil in the community are good bases for policy making as well as in controlling and monitoring its activities. The economic benefits derived from the activities can not outweigh the disastrous effects these could bring to the environment and to the people. Through this project mining policies and appropriate intervention by the government could be developed towards responsible mining.

Hillside placer mining and sluicing contributes to the excessive sedimentation of the riverbed.

Subprogram 3: Development and Verification of Appropriate Technologies for Responsible Mining

Project 1: Rehabilitation of Areas Affected by Nickel Mining in Caraga Region Towards Eco-restoration

In Caraga Region, the nickel mining firms have started rehabilitation towards restoration of the areas affected by their operations and even in indirect impact areas where siltation resulting from their operations flow. Nonetheless, in spite of their efforts, negative environmental effects are still visible that invite critics and environmentalists to call for 'mining ban'. The project will assess the rehabilitation efforts of the mining firms and see if these can be improved to further reduce the negative environmental impacts. Likewise, tested strategies implemented in countries that have passed this stage of mining concerns are worth verifying such that the cost of the operation would be lessened.

Project 2: Rehabilitation of mercury-contaminated gold mining sites in South Cotabato and Sultan Kudarat Provinces University of Southern Mindanao

The project will identify remedial actions that can reduce level of mercury contamination in mining-impacted ecosystems of T'boili, South Cotabato and Bagumbayan, Sultan Kudarat. It specifically will (1) determine and propagate plants species with potential for phytoremediation and assess heavy metal uptake with mycorrhiza association; (2) determine suitable rehabilitation technology for the impacted ecosystems; and (3) monitor success of rehabilitation using different indicators.

Project 3: Alternative Technology for Processing of Chromite and Laterite Ores: Fe-Ni-Cr-C alloy Production

The present study is possibly the first of its kind related to production of crude stainless steel melt by direct smelting of chromium and nickel ore mixtures, in order to save electricity and production costs. Conventional production of stainless steels involves smelting of ferronickel, ferrochromium alloys and pig iron/steel. This gives new impetus to develop a technology, which is much simpler in the production of crude Fe-Ni-Cr-C alloy without use of the ferrochromium and ferronickel alloys, and utilize the iron from both chromium and nickel ores.
The ultimate aim of the project is to achieve a detailed understanding of chromite and laterite ores smelting to produce Fe-Ni-Cr-C alloy and to assess the feasibility of a new, more energy-efficient technology for the direct processing of crude stainless steel.

Project 4: Development of an Alternative Technologies for Small-Scale Gold Mining in CARAGA and South Cotabato Region

This proposed alternative technology follows the cleaner technology, reduces the exposure of small-scale miners to toxic substances such as cyanide and mercury which causes health problems, minimizes cyanide and mercury waste in the environment, furnish information on the feasibility of recovering gold using non-conventional techniques, and direct smelting recovers unliberated gold that amalgamation cannot recover.

The present proposal is designed to examine the gold processing technologies currently being used by miners in the CARAGA and South Cotabato Region, and identify some alternative mercury- and cyanide-free techniques that can be adopted in CARAGA and South Cotabato Region

Project 5: ICT Support for Responsible Mining (Use GIS, Data Mining, DSS for Analysis of Selected Mining Areas in Mindanao

Geographic Information System (GIS) has become indispensable in addressing complex environmental issues. Most mining information, such as facility/asset information, has some sort of spatial component that can be visualized in map form using a combination of ground surveys and GIS technologies. Pipelines, electric lines, roads, ramps, and other mining facilities change frequently. Engineers and operations staff use GIS for facility planning applications. Keeping track of existing infrastructure and integrating it with the mine plan and block models can be achieved with GIS. GIS can also be used to integrate recent survey data with block models or mine design data from other mining software packages.

In this project component, combination of GIS & Data mining, DSS can help to improve decision-making, elimination of paper based records, pin charts etc. The integration of this tool identifies many intangible benefits such as providing maps for the biodiversity threats, landscape analysis and rehabilitation tool for the mining areas.

The project will develop information systems and generate GIS-based threat analysis and assessment of selected mining areas in Mindanao.

IV. ENABLING EMERGING TECHNOLOGIES

Emerging technologies provide solutions to pressing national and global challenges as well as providing fertile ground for sustainable business opportunities. As such, PCIEERD continues to support programs and projects that utilize new and emerging technologies that would have the greatest potential impact in the near and long-term future in terms of national development and improvement of quality of life.

Genomics

Program: Capability-building in Research and Development on Genomics

Project 1. Establishment of the Philippine Genome Center DNA Sequencing Core Facility (DSCF)

*National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman

The Philippine Genome Center (PGC) DNA Sequencing Core Facility (DSCF) was established primarily to provide sequencing and genotyping services to academic research groups in the country and to the wider scientific community. Next-Generation DNA Sequencing (NGS) technologies, phenotyping and bioinformatics tools are the essential research infrastructure components of the Genome Center Core facility.

In 2012, the project completed the design and renovation of the designated rooms in the new National Institute of Molecular Biology and Biotechnology building into a sequencing facility. To support the core facility operations, equipment such as medium-throughput NGS sequencer, high-throughput NSG sequencer, capillary (Sanger) sequencer, real-time Polymerase Chain Reaction (PCR), and accessories and reagents for these machines were purchased.

To train and produce competent human resource, the project staff attended trainings at Life Tech Training Center in Singapore on hands-on wet lab training on the whole workflow of the NGS System on Torrent Personal Genome Machine (PGM) and at Beijing Genomics Institute in Shenzen, China on NGS application.

Program: Capability-building in Research and Development on Genomics

Project 2: Establishment of the Philippine Genome Center Core Facility for Bioinformatics (CFB)
*Marine Science Institute,
University of the Philippines Diliman

The establishment of the Philippine Genome Center Core Facility for Bioinformatics aims to set up a high-performance computing system that would address the immediate needs of PGC researchers for storage, processing, and analysis of Genome data. Also, the project aims to train personnel for effective implementation of various bioinformatics research and user support programs.

In the first year of operation, installation, development and/or testing of various bioinformatics software and databases were conducted. A web portal providing online access to bioinformatics tools was also developed. Further, user support staff were trained on various bioinformatics and computing techniques.

Abaca Functional Genomics: High Throughput Discovery of Genes and Molecular Markers

*Institute of Plant Breeding, University of the Philippines Los Baños

Expressed sequence tags libraries from various tissue types and during virus infection will ne assembled and evaluated for abaca functional genomics.

Genomics and Functional Analysis of Traits of Saba / Cardaba Mutants with Resistance to Banana Bunchy Top Disease

*University of the Philippines Los Baños

Genetic characterization on Saba, a very valuable banana cultivar in the Philippines, will be conducted. Further, the project will identify genes that are upregulated or downregulated in disease resistant genotypes. Also, itt will utilize a combination of techniques in tissue culture, pathology, microbiology and genomic techniques as well as bioinformatics analysis.

Varietal Development of Saba/Cardaba with Delayed Ripening Trait

*Institute of Plant Breeding, University of the Philippines Los Baños

The project will involve three studies with the general aim of understanding the role of MADS-box genes in the regulation of Saba fruit ripening. It will combine molecular biology techniques with conventional functional analysis. Results of these studies will be correlated with ripening behavior of Saba fruits.

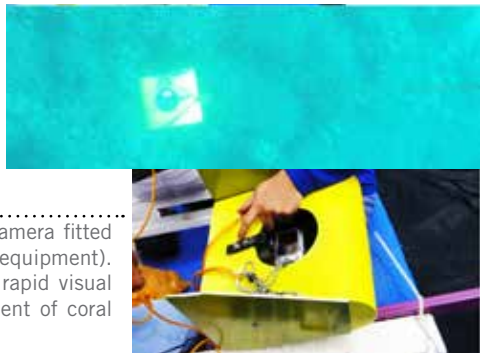
Automated Rapid Reef Assessment

*National Institute of Physics,
University of the Philippines Diliman

An underwater video camera system fitted into a hull (Teardrop Equipment) was developed that enables it to be easily towed by a banca. This technology allows rapid visual recording and assessment of coral reefs.

The Teardrop Equipment was deployed to the following communities/ academe:

- Institute of Environmental and Marine Science, Silliman University, Dumaguete City
- Western Philippine University, Puerto Princesa City (PPC) Palawan
- City Agriculturists Office, PPC
- Palawan State University, PPC
- Island Garden City of Samal, Davao del Norte
- Mindanao State University, Sanga-Sanga, Bongao, Tawi-Tawi
- Batangas State University, Lobo, Batangas



An underwater video camera fitted into a hull (Teardrop equipment). The technology allows rapid visual recording and assessment of coral reefs.

99mTc and 99mTc Radiopharmaceuticals: Preparation and Quality Control for Nuclear Medicine Applications

*DOST-Philippine Nuclear Research Institute

The project aims to provide locally the technology for the preparation of the most commonly used 99mTc-labelled radiopharmaceuticals, which can be used for bone-scanning and renal imaging.

The Tc-99m generator facility at the Radiopharmaceutical laboratory of the Philippine Nuclear Research Institute was co-funded by the IEAE, Japan, and DOST. Said laboratory was inaugurated by PNRI on December 10, 2012. Safety regulations and request to operate are being processed.

Interdisciplinary Signal Processing for Pinoys (ISIP Program)

Project 1: Digital Database of Filipino Words (Bantay Wika)

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

A large database of Filipino words will be developed to be able to develop a good language model for Filipino. This will be done by using a web-crawler to search and process text information from the Internet and use it for analysis. The Filipino language model will be developed using the – Stanford Research Institute (SRI) language modeling toolkit. A language classification tool will also be used for automatic classification of the correct context of Filipino words in the database. Finally, a web-based application will be developed to facilitate a user-friendly interface for the classification system and this will also serve as a platform in developing other language-based applications that will use the Filipino language model.

Project 2: Automatic Detection of Code-switching from English-Filipino

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

The project introduced computational methods to detect code switching in the Philippine context. A review of existing language resources was done along with the design of the architecture of the system using Natural Language Processing techniques and tools. The system was tested considering the standards for testing being used in code switching projects involving other languages.

Project 3: Real-time Closed Captioning for Broadcasted News in Filipino

*Electronics and Electrical Engineering Institute, University of the Philippine Diliman

The Real-Time Closed Captioning System for Filipino is an initial undertaking of this application for television in the said language. It consists of an Automatic Speech Recognition (ASR) system as its front end, recognizing the spoken sentences and transcribing them to text, to be shown in real-time on the television screen while a viewer watches.

Project 4: Development of an Automated Filipino Essay Grader

*Department of Computer Science, University of the Philippines Diliman

An automated Filipino essay grader was developed through the following activities: (1) consultation to experts regarding the technical aspect of Filipino essay grading such as grammar rules and specifications; (2) collaboration with the primary and secondary schools to secure student's essays written in Filipino language regarding a single topic; (3) testing the algorithms, Latent Semantic Analysis (LSA) and Common Interface (CI) for content and discourse module and N-gram LSA for Grammar module; (4) Data pre-processing and system validation.

Project 5: Implementation of a Real-time Filipino Speech Synthesizer

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

Speech synthesis is the automatic generation of synthetic speech with the use of machines such as computers from text input. Current state-of-the-art systems use either unit selection or Hidden-Markov Model (HMM) based techniques. The unit selection technique uses

large database of speech units to build synthetic voices. Since actual speech samples are being used, high quality and natural sounding output can be achieved. The HMM method uses statistical parameters of speech rather than the actual speech units in building synthetic voices.

For the Filipino Speech Synthesis System, which was developed in the UP DSP Lab, the unit selection method was applied but requires further improvement. For this project, unit selection was enhanced by optimizing the cost functions that is used to determine the proper units to be concatenated. HMM synthesis was also applied and tested for Filipino speech synthesis system to determine which of the two methods works best for the Filipino Language.

Project 6: Philippine Languages Database for Mother Tongue-Based Multilingual Education and Applications

*Electronics and Electrical Engineering Institute, University of Philippines Diliman

Databases of ten (10) spoken languages in the Philippines aside from Filipino will be created.
These languages are Tagalog, Cebuano, Ilokano, Hiligaynon or Ilonggo, Waray-Waray, Kapampangan, Chavacano (Spanish Creole), Northern Bicolano, Pangasinense, and a code mixed language of Filipino and English.

These language databases are not only meant to preserve the important heritage of our country but will also be used for a training and developing speech-based software applications that could benefit abled and differently-abled speakers, learners, or even those who are foreign to a particular language.

Project 7: Development of an English Language Training Software for Call Centers

*Department of Computer Science, University of the Philippines Diliman

Using the survey results from the call centers, a 100-hour training program will be developed by Speech, Linguistics and English professors, targeted at improving the English proficiency of call center applicants. A speech recognition engine will be developed in coordination with English language, linguists and speech experts; and their 100-hour training program will be integrated in the speech recognition engine. The software will also include voice recording, playback and English language exercises. The developed software will be field tested at volunteer call centers by conducting pre-test and post-test, using the BPAP National Competency test – English Proficiency portion.

Dr. Rhandley Cajote, ISIP Program Leader, explains one of the features of the English language software.

Development of Affect-sensitive Interfaces

*Ateneo de Manila University

Under this project, the researchers will develop several emotionally intelligent Embodied Conversational Agents (ECAs) that can recognize and respond effectively to user affect. The study begins with a selection of application areas for which it may be possible to build an ECA. These application areas may include, but are not limited to the educational software, games, productivity tools, business tools and others.

Towards the Development of a Self-Improving and Ambient Intelligent Empathic Space: Data-centric, Multimodal Empathic Modeling from a Pluridisclipinary Perspective

*De La Salle University

Project 1: Development of a Scalable Computing System for an Ambient Intelligent Empathic Space

The design and development of a scalable computing platform will be investigated for an ambient intelligent emphatic space. It will require the design of a physical space (a) that captures data (in the form of video, audio, movement), (b) whose devices and sensors communicate to exchange data, (c) whose light, music and temperature configurations change in response to its user's affect and behavior models.

Project 2: An Adaptive Multimodal Affect Recognition System in the Empathic Space

An adaptive, multimodal, data-driven affect recognition system will be developed for the emphatic space. Specifically, this research will build a corpus of naturalistic emotions to train the system; develop three models of human affect based o speech signals, physiological signals and facial expression; and, automate the feature selection technique for an adaptive approach to emotions classifications.

Project 3: Using Body Movement for Automatic Human Identity and Emotion Recognition in the Empathic Space

A software prototype capable of automatically recognizing a human subject and his emotion based on video images will be developed. The prototype accepts a video image of a human subject, segment it into smaller video streams and uses image processing and analysis to remove noise and extract relevant features from the video to recognize and human identify his emotion currently is. It uses not only facial features but also motion feature, i.e. gait, posture and cadence to identify the human subject and his emotions.

Project 4: Adaptive and Self-Improving Emphatic Responses for an Ambient Intelligent Empathic Space for Autistic Children

*De La Salle University

This project aims to provide empathic response for an ambient intelligent empathic space. Ambient Intelligence is the effective transparent support to the activity of subjects through the use of information and communication technologies. It is centered on action, situation and presence. An ambient intelligent space has three factors: ubiquitous computing, ubiquitous communication and intelligent user interface. This project will apply empathy in a ubiquitous domestics environment so that it not only keeps track of the inhabitant's behavior, rather it also takes into consideration his affect.

Project 5: Developing an Adaptive Music-based Affect Model for Autistic Children a Self-improving and Ambient Intelligent Empathic Space

*De La Salle University

A self-improving affect model will be developed to describe the emotional response of the listener top music using the music components, which may include one or a combination of the following: Rhythm, Pitch, Harmonics, Intensity, and Timbre. Using this model, music files and music segments will be labeled with emotion tags (i.e. happy, sad, fear, angry, etc.). Further, a prototype of a music classifier will be developed to classify music using personal preferences of the user or listener.

Project 6: Empathic Educational Software for Children with Autism

*De La Salle University

A prototypical educational software system will be developed for teaching children with Autism Spectrum Disorder (ASD) how to recognize emotions via helping them identify their own while performing some simple learning task.

The said system will have facial emotion recognition module for identifying a child's most likely emotion. A virtual agent within the system will then interact with the child based on such information. This system will be developed on a mobile platform, specifically the iPad2, so as to promote mobility and pervasiveness.
Ongoing (photo to be supplied)

Capacity-building in Support of the Pilot Testing of the DOST Tablet Computers

*DOST-Advance Science and Technology Institute

The projects seeks to contribute to the improved delivery of educational content especially in the primary education, and consequently, to the improvement of the quality of Philippine education. By utilizing efficient and affordable innovation in ICT, the student can adapt to new ways of learning in this information age.
The project provides the necessary required number of tablet computers for the pilot testing spearheaded by the DOST-SEI. The pilot testing will involve the deployment of tablet computers to selected public schools in the country. These include two (2) schools in NCR, one (1) in Cavite, two (2) in Bicol Region, two (2) in Region VIII, and two (2) in Region X. Various metrics will be used to measure the effectiveness of using tablet computers as a learning tool. The projects will also provide training to trainers and teachers as part of the pilot test deployment as well as first level support for the deployed units.

DOST Tablet developed by DOST-ASTI.

Development of an Educational Data Mining Workbench

*Department of Information Systems and Computer Science, Ateneo de Manila University

The proposed EDM Workbench is a software tool that will accept as input raw data from intelligent tutors, reprocess it according to the specifications of researchers and analysts, and output it into formats that other analysis tools can read. Specifically, the tool will enable the researchers to:

- Define and modify behavior categories of interest
- Label previously collected educational log data with categories of interest
- Collaborate with others in labeling data by providing tools
- Validate inter-rater reliability between multiple labelers of the same educational log data corpus
- Analyze textual data (e.g., chat) in collaborative learning situations
- Automatically distill additional information from log files
- Produce code that can be used to immediately transfer the detectors generated by the EDM Workbench
- Export resultant models of student behavior to tools, which enable sophisticated secondary analyses

Rain Monitoring and Alarm System Using Hybrid Wireless Networks as Sensors

*Department of Electronics, Computer and Communications Engineering, Ateneo de Manila University

This project describes the installation and deployment of a highly scalable proof-of-concept hybrid broadband wireless network with 26 Ghz transceivers WIPAS (Wireless IP Access System) as its core technology in combination with 5 GHz transceivers from SMART. The system is characterized with and without the presence of rain (the primary tropical meteorological event) via the use of conventional tipping bucket rain gauges and new rain sensors based on the measurement of acoustic signals. Dropped packets and received signal levels are monitored in real time and synchronously with rain rate sensor data. These independent measurements verify a novel and powerful approach to real time disaster monitoring and management that is scalable to national and even regional dimensions.

The project also looks at developing a conceptual design for a mobile phone-based and/or web-based rapid response Disaster Alarm System for users. The conceptual design will cover the automation of warning system and the visualization software for presentation of real time results.

3-D Gestures on 2-D Screen for User Interface

*University of the Philippines Diliman

While mobile devices are now capable in depicting 3D objects and environments, there is still a lack of a de facto standard when it comes to interacting with 3Denvironments. Previously, the use of cameras is required to be able to fully map out the 3 coordinate system. This project proposes using only the multi-

touch surface as input to the 3D world by tackling the challenge of mapping out and translating the 2D input to its supposed 3D world counterpart. Human computer interaction is in the form of 3D gestures. This can be applied to different scenarios, one of which is in manipulating or controlling 3D objects and environments in digital games, particularly in educational games.

LEAP: Learning While Playing

*Electronics and Electrical Engineering Institute, University of the Philippines Diliman

A framework was developed based on educational learning theories to ease integration of technological media with school curricula. The framework aims to create a solid foundation for future development of educational software, such as educational games and teacher-centric tools.

Towards a Context-Aware Classification and Retrieval System of e-Learning Materials

*Department of Computer Science, University of the Philippines Diliman

A more efficient retrieval system was developed for e-learning materials by focusing on learner-centered contextual attributes. Taking into account ontologies for e-learning developed in other countries, the project developed its own ontology for its target domain: primary Science and Mathematics education in the Philippines. The derived ontology and classification framework was used to provide an interface to a context-aware retrieval system of e-Learning materials for the target domain.

Development of a Microwave-Induced Atmospheric Plasma Jet

*National Institute of Physics, University of the Philippines Diliman

An atmospheric plasma jet will be developed by replacing the plasma chamber and vacuum systems from conventional low pressure plasmas with customized tapered waveguide and gas nozzle system. To test the capability of the plasma jet assembly, various industrial surfaces such as metals, polymers, plastics, wood, and glass will be treated by various plasma jets for enhanced wettability characteristics. The improved wettability will greatly enhance the adhesion of glue to material surfaces and allows the paintability of certain materials such as polymers and plastics.

Physical Vapor Deposition (PVD) of Advanced Max Phase Materials

*National Institute of Physics, University of the Philippines Diliman

A reliable and reproducible PVD procedure will be established using a magnetized sheet plasma facility for obtaining advanced MAX thin films with desirable properties for functional and decorative applications.

Synthesis of Hybrid Nanocomposites from Coconut Fatty Acid for Polymer and Biomedical Use

*Institute of Chemistry, University of the Philippines Diliman

The synthesized hybrid nanocomposite from coconut fatty acids and montmorillonite clays was fabricated for polymer and biomedical application. Product was tested for the biodegradability, thermal, mechanical and physical properties.

Preliminary Investigation on the Development of Fire Retardant from Nano-Structured Inorganic Materials

*DOST-Forest Product Research and Development Institute

A nano-structured fire retardant was developed and applied to plywood. The result showed improved performance of plywood products against fire. Production cost at lab scale was computed at around Php 119.29. With a 50% mark-up the selling cost is computed at Php 178.69 which is much lower than the cheapest commercially-available fire retardant.

Development of Nanostructured Composite Coatings by Electrodeposition

*DOST-Industrial Technology Development Institute

The project obtained a zinc (Zn) nanosized inorganic composite coating on mild steel substrate and fabricated a prototype/sample product (component or part) of electrodeposited Zn-inorganic nanoparticle composite steel.

Synthesis of Nanosilica from Local Silica for High Performance Concrete

*DOST-Industrial Technology Development Institute

The project developed nano- silica from natural resources for high performance concrete with higher compressive and flexural strength.

Program Title: Development of Nanosensors and Nanostructured Materials from Agricultural By-products for Enhancement of Food and Agricultural Productivity and for Environmental Sensing and Remediation

Project 1: Removal of Arsenic from Contaminated Water Using Modified Biopolymer-Silica Nanocomposite Materials

*University of the Philippines Los Banos

Optimization and scaling-up process will be conducted for the production of nanosilica and chitosan hydrogels for the efficient use in the remediation of arsenic from groundwater will be conducted.
The research will also explore the feasibility of utilizing the proteinaceous by-products of the poultry industry (i.e., keratin nano-fibers from feathers and bone) for the remediation of arsenic-contaminated groundwater.
It will also characterize the prepared nanozeolites, chitosan-derived hydrogels using XRD, SEM, AFM, and spectroscopic analyses

Project 2: Detection and Analysis of Arsenic in Contaminated Water

*University of the Philippines Los Banos

Nanomaterials from agricultural by-products will be utilized for arsenic detection and analysis in water samples.

Project 3: Development of Nano-Biosensors for the Detection, Monitoring and Diagnosis of Diseases of Banana and Abaca

*University of the Philippines Los Banos

Field-operable nano-biosensors will be developed for the detection, monitoring and diagnosis of plant viral diseases ABTV and AMV in abaca and BBTV and BBMV in banana.

Project 4: Development of a Zinc Oxide Thin Film for Gas Sensing

*University of the Philippines Los Banos

Functionalized zinc oxide thin film will be developed as gas sensor.

Project 5: Development of Controlled Release Nanoencapsulated Plant Growth Regulators from Locally Isolated Plant Growth Promoting Bacteria (PGPB) for High Value Crops Production and Tissue Culture of Coconut (Cocos nucifera L.)

*University of the Philippines Los Banos

A nanoencapsulated plant growth regulator will be developed for the production of high value crops and micropropagation of Coconut (Cocos nucifera L.).

Project 6: Optimization and Bench-scale Preparation of a Hemicellulose-chitosan/tripolyphosphate (polyphosphate) Nanocomposite Coating and its Use in the Postharvest-life Extension Papaya (Carica papaya L.) Fruits

*University of the Philippines Los Banos

The project will optimize conditions for the extraction of hemicelluloses from pineapple crown leaves or sugarcane bagasse. Further, it will optimize conditions for the preparation of and characterize chitosan / tripolyphosphate (polyphosphate) nanoparticle and hemicellulose-chitosan tripolyphosphate (polyphosphate) nanocomposite coating. Afterwards, the performance of the hemicellulose-chitosan tripolyphosphate (polyphosphate) nanocomposte coating will be assessed in terms of extending the postharvest-life and high-value Philippine fruits in large-scale. An assessment of the stability (shelf-life) of raw materials and nanocomposite coating formulations will also be conducted.

Project 7: Development of Pectin-Collagen/ Nanocellulose Biocomposite Coatings from Mango Peel and Nata de Coco for the Postharvest-Life Extension of Mango (Mangifera indica L. cv Carabao) and Bell Pepper (Capsicum annuum L.) Fruits

*University of the Philippines Los Banos

Bionanocomposite coatings from polymeric materials derived from food processing and agricultural waste will be produced and apply these to high-value Philippine fruits to extend their postharvest-life.

Project 8: Nanotechnology for the Philippine Forest Products Industry: Cellulosic Nanocrystals from Selected Philippine Bamboo Species

*DOST- Forest Product Research and Development Institute

New products from Philippine bamboo will be developed using modified cellulosic nanocrystals to improve utilization of these materials for increased productivity and better cost efficiency. The specific objectives:

Project 9: Characterization and Performance Analysis of Nanosilica Powder Incorporated in Biodegradable Film Based on Cassava Starch for Food Packaging Applications

*University of the Philippines Los Banos

Biodegradable films incorporated with different amounts of nanosilica powder from rice hull ash will be produced from this project.Further, biological films will be characterized and its tensile properties, percent elongation at break, water vapor transmission and oxygen transmission rate will be determined.

Project 10: Performance analysis of nanosilica-in-fluid dispersion (Nanofluid) used as coolant in heat exchange

*University of the Philippines Los Banos

The project will analyse the performance of nanosilica–in–fluid dispersion (nanofluid) derived from rice hull ash in a mini heat exchanger.

Project 11. Evaluation of Nanosilica Powder from Rice Hull Ash used as Silicon Fertilizer for Tomato (Lycopersicon esculentum) Plants

*University of the Philippines Los Banos

The project will evaluate the potential use of nanosilica powder from rice hull ash as silicon fertilizer for tomato. Further, the effects of nanosilica powder as silicon fertilizer on morphological and developmental characteristics of tomato plant will be determined and its performance with existing silicon fertilizers will be compared.

Polymer Electrolyte Systems Based on Carrageenan for Solid State Dye Sensitized Solar Cell (DSSC)

*De La Salle University

The current configuration of DSSC using nano particles of TiO2, Ru dye and liquid electrolyte is unstable and poses long term reliability problem due to the volatile and corrosive nature of the liquid electrolyte. Moreover, it's manufacturability is not truly cost effective and practical due to the leakage problem in sealing the liquid electrolyte. It is the aim of this research tov Develop and fabricate a solid type electrolyte system by investigating the use of carrageenan composites as polymer electrolytev Optimize the self-assembly conditions of the polymer electrolyte systemsv Study the impact of carrageenan molecular weight and electrolyte concentrations in facilitating better ion transport. v Fabricate DSSC incorporating the optimized polymer electrolyte film v Measure the energy conversion efficiency and long term stability of the fabricated DSSC

Synthesis of Carbon Nanotubes (CNT) – Silicon Heterojunction for the Fabrication and Assembly of a Solar Cell

*University of the Philippines Baguio

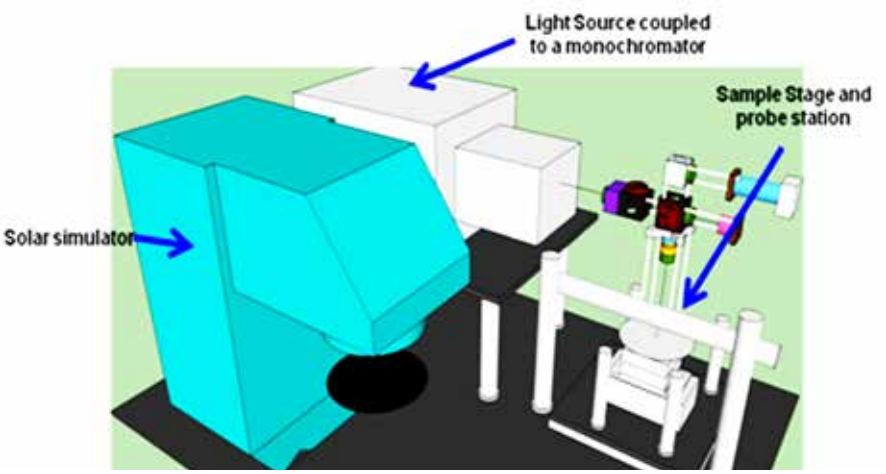
A deposition system for the synthesis of carbon nanotubes (CNT) will be built in large scale. Further, the the energy conversion efficiency of CNT- based solar cell will be enhanced to be better than the conversion efficiency of commercially available solar cells. The project will also design and develop a system to integrate the solar cell with the electrical storage device for testing, and characterize and assess the performance of the solar cell system.

Program: Nanostructured Solar Energy Devices

Project 5: Solar Cell Characterization Facility

*National Institute of Physics,
University of the Philippines Diliman

The solar testing facility to be used for characterizing solar cell samples is fully operational. A test to determine the solar efficiency of commercially available solar cell samples was also conducted; solar cell devices from the CMPL laboratory were also fabricated. Further, the project used a solar simulator as illumination source for testing the devices' response to light. This is to ensure that the tests done in the facility mimics the conditions outside the laboratory - consistent and stable.



A schematic arrangement of the solar testing equipment at the National Institute of Physics, University of the Philippines Diliman.

Novel Polyaniline Synthetic Transition Metal Smectite Nanocomposites

*Mariano Marcos State University

A 20 um-thick free-standing nontronite – PAni conductive nanocomposite film was fabricated that has comparable electrical property with traditionally prepared PAni nanocomposite pellets. It can be referred to as a highly-oriented clay-polymer nanocomposite. Its target use will be for electro optical materials.

Human Resource and Institution Development

PCIEERD's human resource and institution development program provides the mechanism for formulating plans as well as evaluating, monitoring and implementing programs and projects intended to develop capability of human resources and institutions to undertake R&D in industry, energy and emerging technology.

Scholarship Program

In 2012, PCIEERD continued to implement its Human Resource Development Program (HRDP) and the Accelerated Science and Technology Human Resource Development Program (ASTHRDP) of the Department of Science and Technology. Both programs provide MS and PhD scholarships in science and technology as well as engineering and emerging fields.

Table 1. Distribution of scholars in the graduation program from January to December 2012

STATUS	PCIEERD-HRDP	DOST-ASTHRDP
New MS		3
Ph.D.		
Ongoing MS	7	9
Ph.D.	2	25
TOTAL	9	37

Table 2. Distribution of graduates as of end of the first semester SY 2012-2013

STATUS	Graduated in December 2012	Total number of graduates (as of end of December 2012)
ASTHRDP		
MS	42	162
Ph.D.	10	13
TOTAL	52	175
PCIEERD		
MS	10	350
Ph.D.	2	120
Dissertation	2	
TOTAL	12	470

Fellowships in Advanced S&T (FAST)

PCIEERD provided financial assistance for the conduct of dissertation of two (2) PCIEERD scholars in schools abroad. Ms. Rosalie Reyes is doing her PhD research titled "Defining the Height System and Vertical Datum in Metro Manila Based on an Equipotential Surface" at the Asian Institute of Technology, Thailand. Ms. Reyes is a PhD student in Remote Sensing and Geographic Information Systems. Mr. Joel Sadol is also doing his PhD in Remote Sensing and Geographic Information Systems at the Asian Institute of Technology, Thailand.

PCIEERD is supporting Ms. Rosalie Reyes in the conduct of her dissertation at the Asian Institute of Technology in Thailand

Further, PCIEERD through its Overseas Research Enrichment/Sandwich Program continued to support a DOST-ASTHRDP scholar, Ms. Lilia Fernando in the conduct of her PhD research titled "Biogenic Synthesis of Nanoparticle and its Use as Transducer in the Fabrication of Biosensor for the Rapid Detection of e.coli 0157:H7" at the Michigan State University, USA. Ms. Fernando completed her Ph.D. degree in Summer 2012.

Post-graduate Research Fellowship

The Council also supported Dr. Ryan Balili from the Physics Department of the Mindanao State University-Iligan Institute of Technology complete his post-graduate research titled "Development of a Homogenous Assay for Saxotoxin Based on Optical Signals from Gold Nanoparticles."

PCIEERD supported the Post-graduate Research fellowship of Dr. Ryan Balili

In 2012, PCIEERD supported a new post-graduate research fellow, Ms. Jazelyn Salvador from the Natural Sciences Research Institute of the University of the Philippines Diliman conduct her research titled "Y Chromosomal DNA Variation of the Filipino Population using Rapidly Mutating (RM) Y-chromosome Specific Short Tandem Repeat (STR) Markers."

Faculty Immersion

In 2012, PCIEERD introduced a new program that provides opportunity for a faculty member who wish to gain research experience by being engaged in a research activity conducted by a PCIEERD network institution. The research activity should be in any of PCIEERD's R&D priority areas and may be conducted for a maximum of one term.

Through said program, Mr. Alexander Abad and Ms. Ann Dulay, faculty members from the De La Salle University had the opportunity to work on the SMART WIRE project at the Electrical and Electronics Engineering Institute of the University of the Philippines Diliman through Dr. John Richard Hizon. The immersion took place for 8 weeks from April 10 to June 14.

Mr. Hamdi Muhyuddin Barra from the Mindanao State University – Marawi City conducted his immersion at the National Institute of Physics of the University of the Philippines Diliman. Mr. Barra I working with Dr. Henry Ramos as host researcher. The program started in December 2012 and will end in May 2013. Mr. Barra is working with Dr. Ramos' project on "Physical Vapor Deposition of MAX Phase Thin-Films using the Magnetized Sheet Plasma Negative Ion Source for Advanced Decorative and Funtional Applications."

Visiting Professorship

The Physics Department of the Mindanao State University – Iligan Institute of Technology (MSUIIT) invited Dr. Pinky Bautista, a professor from the Department of Pathology, Harvard Medical School, as a Visiting Professor from November 26 to December 7, 2012. Dr. Bautista gave lectures on the Basic and Advances in Images Processing and its Applications as well as Workshop and Lecture Series on Multispectral Imaging, Visualization, Enhancement and Analysis. She also met with prospective graduate students and faculty researchers from the Department for possible research collaboration. PCIEERD supported Dr. Bautista's visiting professorship at MSU-IIT.

Support for Seminars/Conferences/ Trainings/Workshops

PCIEERD continued to support institutions/organizations in the conduct of their technical seminars/conferences/ trainings/workshops. Out of the 22 requests received and evaluated, PCIEERD approved 17 requests for financial support totaling to an amount of P840,000.00

Table 3. Technical seminars/conferences supported by PCIEERD.

Title of Conference	Date	Institution
2nd Engineering Summit 2012 - The ASEAN Engineering Community in 2015	January 26 – 28, 2012	Philippine Technological Council
Open Seminar on Radiation Processing for Industrial Applications	January 30, 2012	DOST-Philippine Nuclear Research Institute
11th Annual Philippine Computing Science Congress 2011	March 1 – 3, 2012	Computing Society of the Philippines
Annual Scientific Conference of the MICROSPHIL 2012 "Advancing National Development through Microscopy Research"	March 29 – 30, 2012	Philippine Association of Microscopists, Inc. (MICROSPHIL)
Joint conference of the 27th Philippine Chemistry Congress, 2012 Asia-Pacific Conference on Analytical Science and 3rd Regional Electrochemistry Meeting of Southeast Asia (REMSEA)	April 11 – 12, 2012	Kapisanang Kimika ng Pilipinas (KKP)
1st National Symposium and Workshop on Environmental Science	May 7 – 8, 2012	Institute of Environmental Science and Meteorology, University of the Philippines (UPIESM)
41st PSM Annual Convention and Scientific Meeting "Microbiology and Biotechnology: Adapting to the Changing Microbial World"	May 10 – 11, 2012	Philippine Society of Microbiology Inc. (PSM)
Lecture Series on "Advances in Molecular Research: A Key to Understanding Man's State and the Environment"	July 16 – 17, 2012	Biology Department, Mindanao State University –Iligan Institute of Technology
Microelectronics Symposium 2012	September 12, 2012	Electrical and Electronics Engineering Institute, University of the Philippines Diliman
61st Annual Convention of the PhilAAS	September 13 – 14, 2012	Philippine Association for the Advancement of Science, Inc. (PhilAAS)
3rd National Convention of the Philippine Society for Cell Biology	October 18 – 19, 2012	Phil Society for Cell Biology
30th Samahang Pisika ng Pilipinas Physics Congress	October 22 – 24, 2012	Samahang Pisika ng Pilipinas (SPP)
7th Annual Convention of the Mathematical Society fo the Philippines (MSP) - Regions 10,12,ARMM	October 25 – 26, 2012	MSP Regions 10,12,ARMM
Annual Physics Conference Samahang Pisika ng Visayas at Mindanao (SPVM)	October 25 – 27, 2012	SPVM
12th National Genetics Symposium	November 22 – 24, 2012	Philippine Society for the Advancement of Genetics
PhilGEOS 2012: The 1st Philippine Geomatics Symposium	November 23 – 24, 2012	Geodetic Engineering Department, University of the Philippines Diliman
39th Annual Convention of the Philippine Society for Biochemistry & Mol Bio (PSBMB)	November 29-30, 2012	PSBMB

PCIEERD also provided financial support for the conduct of the following projects as shown in table 4.

Table 4. PCIEERD-supported projects.

Title	Implementing Agency	Description
Human Resource Development for Nanoscale Metrology, Tribology and Instrumentation Control (Human Resource Development for Magnetic Storage Recording Head Technology)	National Institute of Physic, University of the Philippines Diliman	This project aims to develop human resource with skills in nanometer-scale metrology using Atomic Force Microscopy and Wyko Interferometry, Instrumentation control system using the NI Development System and tribology using Scanning Thermal Microscopy, Scanning Tunneling Microscope and Raman Spectroscopy through immersion in research projects and exposure to actual industry environment. The learnings gained will then be used to institute new course offerings.
Y chromosomal DNA variation of the Filipino population using Rapidly Mutating (RM) Y-chromosomes Specific Short Tandem Repeat (STR) Markers	University of the Philippines Diliman	This project proposes to evaluate the use of RM Y-STRs in differentiating related males in regional populations. An RM Y-STR database of one regional population such as the National Capital Region, which is a microcosm of the Philippine population will be constructed. The data will be compared with that generated in a worldwide multi-center study on RM Y-STRs that aims to produce a global frequency data by many participating laboratories for forensic applications.
Optical Microstructuring of Superhydrophobic Materials	Mindanao State University – Iligan Institute of Technology	Materials that are naturally hydrophobic may be made superhydrophobic by properly creating microstructures on its surface such as those seen in lotus plants. This project aims to study superhydrophobicity with the intent of using the knowledge in creating superhydrophobic materials in future research work.
Development of a Homogeneous Assay for Saxitoxin based on Optical Signals from Gold Nanoparticles	Research Center for Natural Science, University of Sto. Tomas	This project involves the development of a homogeneous assay format for saxitoxin (STX) based on absorbance/scattering spectral changes in aggregates of an aza-crown ether capture reagent-capped and mercaptoethylguanidine-capped goldnanoparticles. The capture reagent is a 1-propanethiol derivative of 1-aza-18-crown-6 ether.

PCIEERD's Role in DOST's HRD Projects

PCIEERD shares technical expertise in HRD-related projects under DOST-GIA. Most of these projects zero in on enhancing capabilities in ICT, developing appropriate training curriculum for specialized courses, microelectronics education, to name a few.

Table 5. PCIEERD monitored DOST-GIA projects.

Title	Implementing Agency	Description
Developing PNRI Capability for Electron Beam Technology Applications	DOST-Philippine Nuclear Research Institute	The project proposes the establishment of an electron beam (EB) facility at PNRI to serve as an R&D and service facility for different applications of the EB technology in the country. The project will also include training of PNRI personnel on the operations of the facility.

Title	Implementing Agency	Description
Development of Appropriate Training Curriculum Design for CNC Machine Tool Programming and Operation for Sustainable Growth, Productivity and Competitiveness of the Metals and Engineering Sector	DOST- Metals Industry Research and Development Institute	The project aims to address the lack of human resource possessing the skill by implementing a training program on CNC machining. To ensure that the training intervention is effective and will match the manpower requirements of the industry, the training curriculum design is made to undergo a series of review, verification and validation by industry partners.
Strengthening the Safety of Workers Occupationally Exposed to Radiation through the Establishment of Optically Stimulated Luminescence (OSI) Personnel Monitoring System	DOST-Philippine Nuclear Research Institute	Due to the stoppage of manufacture of film badges used in monitoring radiation level exposures of radiation personnel, there is an urgent need to find a dosimeter system to replace the film badge system. In this project, Optically Stimulated Luminescence (OSL) Dosimeter system will be installed in PNRI. The system will include development and implementation of an accompanying information system.
DOST IT Enhancement Program	Information Technology Division - Office of the Assistant Secretary for Strategic Plans and Programs - DOST	A wireless DOST is the next step in achieving a convenient and flexible internet services for the Department. The wireless network technology shall provide an additional and alternative internet access to the whole Bicutan science community to attain a 24/7 internet services. The project shall continue to enhance and upgrade DOST ICT resources. Further, it will implement and sustain application systems developed and provide technical support and services to the ICT demands and requirements of the Department.
MicroEd North: Enhancing Microelectronics Education in the Philippines	Electrical and Electronics Engineering Institute, University of the Philippines Diliman	This project aims to provide training in IC design to faculty of selected schools in Northern Luzon schools with potential for offering microelectronics as well as by introducing IC design in their curriculum.
eDOST Infra: Upgrading of DOST Infrastructure and Interconnectivity Network	DOST-Advanced Science and Technology Institute	The program seeks to improve the DOST's effectiveness in performing its internal operations and delivery of front-line services to the public through competitive and appropriate ICT solutions. It aims to increase the level of ICT utilization in the whole department and all its regional and provincial offices to lower operational costs.

PCIEERD monitors the DOST-GIA project "MicroEd North: Enhancing Microelectronics Education in the Philippinesm," which provides training in IC design to faculty of selected schools in Northern Luzon schools with potential for offering microelectronics as well as by introducing IC design in their curriculum.

S&T Information Dissemination and Promotion

Literacy and knowledge in the industry, energy and emerging technology sectors play a pivotal role in promoting our country's economic competitiveness in the global arena. As such, PCIEERD uses various mechanisms to promote awareness and appreciation of PCIEERD-supported programs/projects/activities/ technologies. These mechanisms are through the research colloquium, exhibits, press releases and radio featured interviews as well as support for conduct of seminars/ conferences.

PCIEERD is committed in ensuring that all technologies supported and/or monitored by the Council are promoted and commercialized. The Council together with partner institutions organized Research Colloquiums in various regions in the country. The Research Colloquium was primarily intended to build up literacy and promote appreciation of PCIEERD's priority areas in science and technology as well as to promote technologies for utilization /commercialization. Table 6 shows the list of PCIEERD Colloquium conducted in different regions in the country.

Table 6. PCIEERD Research Colloquium.

Venue	Date
Hotel Alejandro, Tacloban City	September 26, 2012
KCC Mall, General Santos City	October 11-12, 2012
Central Luzon State University, Science City of Munoz (Biotechnology Research Colloquium)	November 21, 2012
Walter Mart, San Fernando, Pampanga	November 23, 2012

Research Colloquium

Dr. Rhandley Cajote, (left photo) Program Leader of the English Language Training Software for Call Center, presented the features of the software during the PCIEERD Research Colloquium held at KCC Mall, General Santos last October 11, 2012.

Exhibits

PCIEERD participates in various trade fairs and exhibitions to showcase its completed projects as well as promote the Council's priority areas and programs. Table 7 shows the various fairs/activities participated in by PCIEERD.

PCIEERD featured some of its notable projects during the Mindanao Regional S&T Cluster Fair held in General Santos City.

Table 7. PCIEERD participated exhibitions/fairs.

Activity	Date	Venue
1st SPIK Innovation Fair	June 18, 2012	Asian Institute of Management, Makati City
National Science and Technology Week	July 10-14, 2012	SMX Convention Center, Pasay City
Northern Luzon Regional Cluster S&T Fair	July 30, 2012	Batac, Ilocos Norte
OVCRD Colloquium and Fair	August 8, 2012	University of the Philippines Diliman, Quezon City
Mindanao Regional Cluster S&T Fair	October 10-14, 2012	KCC Mall, General Santos City
Microelectronics Symposium 2012	September 12, 2012	Best Western Premeir F1 Hotel, Taguig City
Kabisig Government Expo and Trade Fair 2012	September 17-20, 2012	SM Fairview, Quezon City
Southern Luzon Regional Cluster S&T Fair	November 21-24, 2012	San Fernando, Pampanga
International Electronics Conference and Exposition Philippines	November 22-24, 2012	Philippine Trade Training Center Pasay City
8th National Biotechnology Week	November 26-30, 2012	Gateway Mall, Quezon City
1st Philippine Geomatics Symposium	November 23-24, 2012	University of the Philippines Diliman, Quezon City

Press Releases and Radio Interviews

The PCIEERD mass media as potent tool in bringing information and developments in R&D in the industry, energy and emerging technology sectors into the mainstream of Filipino society. It continues to coordinate with various media organizations in publishing the following press releases:

- Science Agency Boosts Country's Capability in genomics
- Tapping Wastes to Generate Power
- DOST Addresses Problem of Waterways Clogging
- DOST Secretary Designates PCIEERD Executive Director as Officer-In-Charge of the Undersecretary for R&D
- DOST Upgrades Research, Testing Institutes and Regional Laboratories
- President Aquino Appoints New Head for DOST Council
- DOST Supports R&D Project on Faster Reef Assessment
- DOST Gears Up World-class Testing and Research Facilities

PCIEERD coordinated the radio interview of Dr. Arnel Salvador, Program Leader of the Nanotechnology Solar Cell Devices at ABS-CBN's Radio Program *Bago Yan Ah!*

Most of the press releases were published in leading newspapers like the Manila Bulletin, Philippine Star, Philippine Daily Inquirer, Business Mirror and other provincial newspapers and magazines.

Also, PCIEERD coordinated radio interviews to inform recent developments on R&D projects, particularly on the priority areas of PCIEERD. Likewise, the Council was invited to promote its programs and services into radio stations like DZMM-Bago Yan Ah! and Radio ng Bayan – Paaralang Bayan sa Himpapawid.

Promoting Technology Outputs

As part of PCIEERD's information dissemination and technology diffusion, PCIEERD also supports conduct of seminars/ trainings and conferences. Table 8 shows the projects/seminars/conferences supported by PCIEERD.

Table 8. PCIEERD-funded projects/activities.

Project/Activity	Organizer	Date
UP-OVCRD Colloquium Fair	University of the Philippines Diliman	January 16, 2012
Leading through Technology, Enabling Innovations, Advancing Quality Standards and Promoting Productivity Growth	Institute for Small Scale Industries, University of the Philippines Diliman	February 1-2, 2012
5th Annual Research Awards (2012 ARAW) and Young Inventors and Innovators Exhibit	Polytechnic University of the Philippines	March 9, 2012
International Conference in Technology (InCite) 2012	Far Eastern University	May 10-11, 2012
FPRDI Stakeholders Consultative Meeting	Philippine Trade Training Center	October 3, 2012

Strengthening DOST's S&T Advocacy

The DOST aggresively pursues S&T advocacy, promotion, information dissemination and linkages to promote S&T and to influence and inform the public on the benefits of S&T in their daily life. The PCIEERD shares this advocacy and ensures the goals of the projects are achieved by closely monitoring the following projects.

Table 9. DOST-GIA projects monitored by PCIEERD.

Title	Implementing Agency	Description
Digitization of Publications and Other Media Available in the Specialist Library of the National Academy of Science and Technology	DOST-National Academy of science and Technology	The project aims to digitize all NAST library material for easy and fast access of researchers as well as the general public.
S&T Academic and Research based Openly Operated Kiosks (STARBOOKS)	DOST-Science and Technology Information Institute	The project is aimed at installing STARBOOKS in selected provincial/city libraries. STARBOOKS is a stand-alone, on-site research and information kiosk that provides free access to S&T information to the general public.
Strategic Communication Intervention for the Nationwide Operational Assessment of Hazards (NOAH)	DOST-Science and Technology Information Institute	The project is aimed at disseminating up-to-date pieces of information from the NOAH research program through the NOAH website for use of key c-stakeholders in disaster risk reduction, preparedness, and management.
Strengthening Philippine Science and Technology Advocacy Program in Telecommunications/ICT through Regional Collaborations	Information and Communications Technology office	The project supported the conduct of the ASEAN 12th TELMIN and 13th TELSOM Meetings with Dialogue Partners conducted last November 12-16, 2012 at Cebu City. The activity was intended to promote Philippine interest in telecommunications/ICT sector, strengthen linkages with regional counterparts and R&D organizations for the telecommunications/IT sector; and enhance and strengthen the Philippines image across ASEAN and in international community.

Support for Technology Transfer and Commercialization

Technology Business Incubation Program

Technology Business Incubation (TBI) has been recognized as an effective mechanism to nurture business start-ups in techno-enterprise and hasten commercialization of innovations.

The DOST's TBI Program has three major objectives:

- create jobs
- develop entrepreneurs
- promote public-private partnerships in regional economic development

In 2012, PCIEERD managed and monitored three (3) DOST-supported technology business incubators.

Table 10. DOST-funded Technology Business Incubators.

Project	Implementing Agency/ Project Leader	Location
Support for the Establishment of the UPVCC-DOST Technology Business Incubator at the University of the Philippines Cebu (Year 2)	University of the Philippines Cebu/Prof. Pauline C. Wade	University of the Philippines Cebu, Cebu City
DOST-UP Enterprise Center for Technopreneurship (Year 2)	University of the Philippines Diliman/Dr. Luis G. Sison	University of the Philippines Diliman, Quezon City
Support for the Establishment of DOST-UPLB TBI (Year 2)	University of the Philippines Los Baños/Dr. Enrico P. Supangco	University of the Philippines Los Baños, Laguna

The DOST-UP Cebu TBI assisted 15 resident locators, five (5) virtual locators and 19 participants in Pre-incubation Program. The pre-incubatees and incubatees were provided services such as, Adopt-an-Entrep Program, One-on-One consultations, patent searching, consultation on setting-up a business, market validation, IP related issues and technical consultation with IT adviser.

On the other hand, six (6) start-ups at the DOST-UP Enterprise Center commercialized one technology each. The start-ups are myRemitHub, Moodlearning, Aplus, Paybilis, Kiddle and Filimagineers.

Meanwhile, the DOST-UPLB TBI hosted seven (7) locators relating to biotechnology as well as information and communications technology. The management continues to attract more locators through the conduct of seminar series on Technology Commercialization to various colleges and units of the university.

OpenERP · cebudirectories · pindoco · RAMESES · Codetoki · InnoPUB · Deethur · third team media · tripsiders · techjobs.ph · CyberTech · elumba

FILIMAGINEERS · myRentHub · Suman Valley · PropertyCity.ph · opmpowered.com · PayBilis · SMART · WoodLearning · INNOLUMIN · combix · QUVI · Solve · EP by plus creative · RONDAPALENGKE · EventLy

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Biz Alliance Corp.

Solution's Resource

SERBIZYO

SPARKSCOM

STRIDE Consulting Inc.

ATX GLOBAL Solutions and Consulting Inc.

East Asia

METAHELIX

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gsmatrix

Itemhound

AUBERON

Orchestronix

BASECAMP TECHNOLOGIES INC

TOBECS

CHEXERS

PhilHybrid Inc.

Pushing for the Sustainability and Success of the TBI Program

PCIEERD strongly supports the TBI initiative in light of the Memorandum from the Executive Secretary of the Office of the President regarding Responsible Stakeholdership towards Shared Growth. One of the ways that PCIEERD has identified to align with this directive/framework of increasing and redistributing productive capacity is through strengthening/empowering the TBI ecosystem and leveling-up of TBI's programs.

In 2012, PCIEERD funded the project titled "Strengthening DOST's Technology Business Incubation Initiative," which aims to benchmark and improve incubator practice through the conduct of Incubator Forum: Best Practice Workshop 2012 and raise awareness on the prospects and benefits/rewards of investing in smart start-up technology-based enterprises through the conduct of Investors and Start-ups' Fora.

The said project was implemented by the Technology Resource Center in collaboration with DOST-PEZA Open TBI, UP-Enterprise Center for Technopreneurship, UP-CebuInIT, UPLB ICT and Agricultural TechnoPark and UP-Ayala TechnoHub.

Small Enterprise Technology Upgrading Program

The DOST's SETUP assists SMEs in adopting technological innovations to improve their operations and thus boost their productivity and competitiveness.

Two (2) SETUP Projects were managed and monitored by PCIEERD in 2012.

Table 11. PCIEERD-monitored SET-UP projects.

Project Title	Project Duration	Implementing Agency/ Project Leader	Description
DOST Enhancement Program for Micro/Small and Medium Enterprises (MSMEs) through Technology Transfer Program and Services	1 September 2011 – 31 August 2012	DOST-Industrial Technology Development Institute Dr. Nuna E. Almanzor	The project enhanced the technological capability of micro, small and medium enterprises through technology transfer and technical interventions/services; Additionally, it undertook extensive study/analysis on the experiences of existing enterprises on the adaptation and commercialization of ITDI-DOST developed technologies.
Consultancy for Agricultural and Manufacturing Productivity Improvement (CAMPI) Program	28 September 2011– 27 September 2012	DOST-Technology Application and Promotion Institute Engr. Jovito Rey E. Gonzales	The consultancy services provided by DOST-TAPI through its Manufacturing Productivity Extension and Consultancy for Agricultural Productivity Enhancement Programs helped mSMEs in the regions increase overall productivity and boost their competitiveness. Through these intervention programs, mSMEs enhanced their operations and brought their products to world-class quality to enable them to progress into exporting firms.

Boosting Technology Commercialization and Intellectual Property Rights Application

To ensure that most of the generated technologies supported by PCIEERD would reach commercialization, Technology Assessment was conducted to gauge the present state of these technologies in order to determine their potential for commercialization. In 2012, eight (8) technologies were assessed namely, Photocatalytic Reactor, Innovations on Microbial Rennet Production, Automated Hot Water Treatment Machine for Mangoes, Taro Wine Made from Purple Taro and Black Rice, Shelf life extension of brown rice, Mitigation of erosion in slopes with greater than 60° and extremely eroded gullies thru the use of coco coir geotextiles and biologs, Alternative technology for processing of laterite ores in the production of ferronickel and Charcoal Briquetes using Chichacorn Processing Effluent as Binder.

Also, PCIEERD provided assistance in the transfer of Concrete Paving Block Technologydeveloped by Technological University of the Philippines to DUNARE International Inc. (President Sonny O. Dungca) and Earth Management and Recycling Technologies, Inc. (Marketing Manager Brian M. Arevalo).

Further, the Council facilitated patenting/utility model registration of food-related commerciable technologies generated from PCIEERD-managed projects. The following technologies were endorsed to DOST-TAPI for patenting/ utility model registration assistance:

- Tropical Fruit and Vegetable Juice Blends
- Pre-treatment Technique for Grits from Chickpea
- Ready-to-drink Vitamin-rich Green Mango Juice
- Tea and Juice from Yacon Tubers
- Shelf Life Extension of Brown Rice

Commercializing Innovations thru TECHNICOM Program

PCIEERD supports DOST's Technology Innovation for Commercialization (TECHNICOM) Program. This program provides a comprehensive and unified strategy to enhance technology development for commercialization by providing support funds for pre-commercialization activities. In support of the program's objectives, RITTD actively managed three (3) projects funded under the TECHNICOM Program. These projects are presented in the table below.

Table 12. TECHNICOM-monitored projects.

Project Title	Project Duration	Implementing Agency/ Project Leader	Description
Market Testing and Process Optimization of Industrial Prototype Plasma-Enhanced Chemical Vapor Titanium Nitride Coating Technology (PECVD)	16 November 2011 – 15 February 2013	University of the Philippines Diliman Dr. Henry J. Ramos	The pilot-scale facility is currently being built at the DOST-Metals Industry Research and Development Center with the Asian Semiconductor Electronics Technologies (ASET) Corporation as an incubator.
Capacity Building and IP Protection for Technologies Generated by DOST RDIs and Network Institutions (Year 2)	1 July 2011 – 30 September 2012	DOST-Technology Application and Promotion Institute/ Engr. Manolita Aurora O. Javate	The project developed DOST-wide in-house capability in patenting by providing actual hands-on experience in the preparation, filing and prosecution of applications for patent/utility model (UM) registration.
Production of Nanoclay from Local Bentonite Ore As Additive in Polymer-Clay Nanocomposite Systems	1 June 2011 – 31 May 2012	DOST-Industrial Technology Development Institute Dr. Blessie A. Basilia	The project established a pilot-scale production set-up for bentonite ore sourced from Legaspi, Albay. Also, it generated information on parameters to optimize production of nanoclay for industrial application.

The 8th National Biotechnology Week

In 2012, DOST participated in the celebration of 8th National Biotechnology Week (NBW) that was spearheaded by the Department of Health as Chair and the Department of Education as Co-chair. Anchored on the theme *"Bioteknolohiya para sa Kalikasan, Kalusugan, Kagandahan, Kabuhayan at Kaunlaran! Ok ang Biotech sa Kalusugan Pangkalahatan: Mamamayan at Kalikasan,"* the celebration was held from 26-30 November 2012 at Gateway Suites, 4th Flr. Gateway Mall, Araneta Center in Cubao, Quezon City.

The PCIEERD was the DOST's Focal Agency for the 8th NBW celebration. To ensure the successful participation of DOST, the DOST NBW Task Force was constituted, composed of representatives from the three Councils (PCIEERD, PCAARRD and PCHRD) as well as RDIs (FNRI, FPRDI, ITDI, PNRI), NRCP, TAPI and TRC.

The NBW activities initiated by the DOST were the following:

- Science and Technology (S&T) Forum- highlighted advances in genomics researches and techniques as well as application of biotechnology in industry and agriculture as exemplified in DOST-funded research projects
  - Date: 28 November 2012
  - Venue: Sapphire Rooms 1, 2 and 3 of Gateway Suites

- NBW Exhibit – featured 13 DOST-funded R&D projects on the application of Biotechnology in genomics/health, agriculture, environment and industry
  - Date: 26-30 November 2012
  - Venue: Gateway Suites

- Inauguration of the BIOTECH Pilot Plant - the plant has a Fermentation Engineering Service Laboratory (FESL), with its building and old equipment rehabilitated at a cost of P25 million.
  - Date: 29 November 2012
  - Venue: BIOTECH-UPLB

- Business Forum – co-organized by DOST and DTI; presented business opportunities generated from biotechnology researches that are now available for commercialization. These include the following: biofertilizers, diagnostics kits on biotechnology, animal vaccines and antibiotics, and specialty products.
  - Date: 29 November 2012
  - Venue: BIOTECH-UPLB

In addition, PCIEERD also conducted a Biotechnology Research Colloquium, a collaborative activity of PCIEERD and the Central Luzon State University (CLSU), last 21 November 2012 at RET Amphitheater CLSU. The Colloquium served as Build-up Activity for the celebration of 8th NBW.

(Top photo) BIOTECH Director Dr. Reynaldo V. Ebora, DOST Undersecretary Dr. Amelia P. Guevara, UPLB Chancellor Rey Velasco and NAST President Acd. William G. Padolina led the ribbon cutting during the inauguration of the UPLB-BIOTECH Pilot Plant.

(Lower photos) PCIEERD supported the inauguration of the UPLB-BIOTECH Pilot Plant during the celebration of the 8th National Biotechnology Week last November 29, 2012. Visitors had the opportunity to see the upgraded facility/equipment of the Pilot Plant.

PCIEERD supported the conduct of the DOST-DTI Business Forum held at the UPLB-BIOTECH at Los Banos City. The Business Forum featured the BIOTECH technologies that are ready for commercialization/adoption.

Linkages and Networks

PCIEERD continues to build on its networks and reinforces its linkages having proven that these are two important factors that contribute to accomplishing its major outputs and create a mutually beneficial collaboration with its partners in S&T. Networking, which is actually a socioeconomic activity, is one of the strengths of the Council, and in the past two years, it has added more organizations to its networks, both local and international. Collaborations with its linkages and networks are through joint research/study, exchange of scientists/technical experts, capacity building, scientific and technical access to facilities, provision of professional services, organization of scientific conferences, symposia, training courses, workshops and exhibitions.

ASEAN – Sub-Committee on Sustainable Energy Research (SCSER)

The SCSER, formerly called Sub-Committee on Non-Conventional Energy Research (SCNCER), is coordinating the ASEAN Plan of Action on Science and Technology, in particular, the Flagship Program on Biofuels under the Regional Collaboration of the ASEAN Committee on Science and Technology (COST). For the DOST, PCIEERD technical staff continue to serve as country focal person and provide network linkages among ASEAN R&D institutions. SCSER fosters and strengthens regional S&T activities through technical information exchange, capacity building and technology transfer.

In 2012, a regional workshop was convened for the ASEAN biofuels regional practitioners for the conduct of information exchange and consolidate the status of biofuels implementation and developments, relevant regulations and/or policies, possible harmonization of quality standards and methods of life cycle assessment in ASEAN member states. Another major activity conducted by SCSER was the capacity building for member states on waste-to-energy, in particular solid waste landfill gas extraction and utilization, in cooperation with the Japanese Government.

International Center for Environmental Technology Transfer (ICETT), Japan

The ICETT of Japan seeks to transfer Japanese environmental conservation technology to other countries in order to solve environmental issues worldwide. PCIEERD has been working with ICETT in various sustainable energy technical guidance and capacity development activities.

Early in 2012, PCIEERD, together with ICETT Japanese Energy Experts conducted technical guidance workshop on greenhouse gas emission reduction for commercial buildings. Part of the cooperation, a number of commercial buildings in Cebu have benefitted from PCIEERD and Japanese expertise in the conduct of energy audit as well as technical advice on how energy

The ASEAN Biofuel Flagship Workshop was held in Malaysia on October 16-18, 2012. PCIEERD was represented by Emelita A. S. Dimapilis, Sr. Science Research Specialist.

consumption can be significantly reduced and proposed energy efficient technologies for their particular building application. While late 2012, ICETT engaged PCIEERD for technical guidance cooperation to conduct preliminary techno-economic study for setting-up waste-to-energy project, such as power generation plant using solid waste in the production of biogas as fuel.

US-Environmental Protection Agency (US-EPA) for the Global Methane Initiative (GMI)

PCIEERD has been involved in the GMI public-private partnership since 2008 that advances cost effective, near-term methane recovery and use as a clean energy source in the Sub-Sectors on Agriculture and Municipal Solid Waste. It is executing agency for a project supported by US-EPA under the GMI Program entitled "Capacity Building on Methane Emissions Recovery for Energy Production from Landfills in the Philippines". The project aims to identify cost effective opportunities to recover methane emissions from landfills, identify relevant emissions estimates that will lead eventually to develop country-wide action plans, landfill methane reduction programs and facilitate project development, as well as promote methane recovery and utilization projects for improvement of the local and global energy and environment.

Agencies for the Clean Development Mechanism (CDM) Program

The Institute for Global Environmental Strategies (IGES)
Institute for Global Environmental Strategies (IGES)
UN Framework Convention on Climate Change (UNFCCC)
UN Environment Programme (UNEP)
Asian Development Bank (ADB)

The Council was part of the Third Workshop on Enhancing the Regional Distribution of CDM Projects in Asia and the Pacific held last July 18-20, 2012 at the ADB Headquarters, Ortigas. The three-day workshop organized by the ADB, IGES and the UNFCCC Secretariat, in collaboration with the UNEP aimed to promote and support CDM project activities in Asia and the Pacific countries currently hosting fewer than 10 registered projects, particularly Least Developed Countries (LDCs) and Small Island Developing States (SIDS). It provided a platform for participants to share best practices and key lessons, enhance their knowledge on CDM and discuss technical, financial, and policy issues. The participants included project developers, designated operational entities and CDM consultants with regional representation as well as designated national authorities.
The main theme of the workshop included: (1) Regulatory Framework on Standardized Baselines and Programme of Activities (PoA), (2) Addressing the Common Issues of PoA, (3) Taking Stock of Best Practices and Lessons learned from the region, (4) Addressing Financial Issues, (5) Hands-on exercise for PoA formulation, (6) Developing Action Plans for Asia and the Pacific. One of the selected project ideas under the PoAs is the water purification system for households where the use of ceramic water filters was selected amongst other proposed projects since this is one of the High-Impact Projects of the DOST. The DOST will have to collaborate with other government agencies e.g. DENR to discuss the process that should be undertaken to push the project for ADB funding under Program of Activities (PoAs) in the East and Southeast Asia region. Also, the ITDI was advised to facilitate the patent application for the water filtration technology before submitting the project proposal to ADB.

International Atomic Energy Agency (IAEA)

PCIEERD monitored a DOST-funded project entitled "Performance and Safety Assessment of the Co-location of a Near Surface Radioactive Waste Disposal Facility and the Borehole Disposal Concept in the Philippines" conducted by the Philippine Nuclear Research Institute (PNRI-DOST). In this project, the IAEA provided assistance and guidance through expert missions to PNRI and acquisition of appropriate softwares for safety assessment. The IAEA experts also assisted in the formulation of the conceptual models, the preliminary design of the facility, the level of detail of data requirements, and the implementation of the softwares throughout the project period.

Manila Economic and Cultural Office-Taipei Economic and Cultural Office (MECO – TECO)

S&T cooperation between the DOST and the National Science Council (NSC) of Taipei is specific for areas in genomics, nanotechnology, and biotechnology in application to agriculture (e.g. nanomaterials for agricultural applications, biodiversity and conservation and crop/aquatic stock improvement/safety) and health (e.g. dengue virus including drug discovery and development, development of nano-based diagnostics based on cold and chemiluminescent detection of dengue virus). Other areas for possible collaboration include climate change, environment, geosciences/geohazards and tectonics, and use of sensors towards "Smart Cities".

Committee on Space Technology Applications (COSTA)

The PCIEERD is currently looking at possible collaborations in Space Technology Applications (STA). Initial activities were aggressively participated in like intergovernmental consultative workshops, meetings, and learning visits to review, discuss and make propositions on regional cooperative mechanisms for an affordable and effective use of space-based information, products and resources for disaster management and sustainable development in the Asia-Pacific region. Partnerships and linkages will be explored with the following organizations:

- Remote Sensing Division, Asian Development Bank
- JAXA
- Mitsubishi Electric
- PASCO Corporation
- NEC Corporation
- Japan Embassy
- Korean Aerospace Research Institute (KARI)
- ASEAN Committee on Space Technology Application
- Asian Association on Remote Sensing (AARS)
- University of Southern Queensland, Australia
- Asia-Pacific Regional Space Agency Forum (APRSAF)
- United Nations ESCAP - UN Economic and Social Commission for Asia and the Pacific in
- Thailand
- Regional Space Applications Programme for Sustainable Development (RESAP)
- Goddard Space Flight Center, NASA

International Networks for PCIEERD's Fellowships in Advanced S&T (FAST), Overseas Research Enrichment/Sandwich, Post PhD Programs and Visiting Professorship

The Council maintains its international linkages with universities abroad for the for its continuing program for Fellowships in Advanced S&T (FAST). This is for the conduct of overseas research enrichment and sandwich programs as well as post PhD programs.

For 2012, the PCIEERD was able to tap the Michigan State University, USA and the Asian Institute of Technology, Thailand as University/Host Institutions for the sandwich program and post PhD programs of three of its scholars.

The Council was also instrumental in facilitating the Visiting Professorship activity where professors or experts are invited to give lectures or workshops on special fields. In November 2012, the Harvard Medical School, Boston, Massachusettes sent Dr. Pinky Bautista, Professor, Department of Pathology, to give lectures on the Basic and Advances in Images Processing and its Applications was conducted, as well as Workshop and Lecture Series on Multispectral Imaging, Visualization, Enhancement and Analysis. The beneficiary was the Physics Department of the Mindanao State University – Iligan Institute of Technology (MSUIIT).

The National Science Consortium

Human resource development remains a priority of PCIEERD with the end view of developing a smart S&T manpower base that is crucial to industries and in the overall development programs of the country. It is also through the establishment of consortiums that the exchange of resources in terms of expertise, access to facilities, information sharing and joint research and studies is carried out collaboratively.

The PCIEERD established the National Science Consortium for its scholars who are taking up degree programs in science. It is composed of the following universities:

- Ateneo de Manila University
- De La Salle University
- Mindanao State University – Iligan Institute of Technology
- Siliman University
- University of the Philippines Diliman
- University of the Philippines Manila
- University of the Philippines Los Banos
- University of San Carlos
- University of Santo Tomas
- Xavier University

The Engineering R&D for Technology (ERDT) Consortium

PCIEERD has been shepherding the ERDT Program that has a scholarship component and an R&D component which are both focused on the engineering sector. Human resource development is the main goal of the program to produce a good number of research engineers with MS and PhDs and improve the R&D program in engineering. The R&D component is developing specializations in universities based on the identified needs of technology-based industries. The research thrusts on energy, environment and infrastructure, ICT and semiconductor and electronics are all under PCIEERD's coverage and has facilitated the conduct of R&D projects in these areas. The following universities are the partners of PCIEERD in the ERDT program:

- Ateneo de Manila
- Central Luzon State University
- De La Salle University
- Mapua Institute of Technology
- Mindanao State University – Iligan Institute of Technology
- University of the Philippines Diliman
- University of the Philippines Los Baños
- University of San Carlos

S&T Governance and Management

The PCIEERD looks at the overall growth or improvement of its personnel to make them competent in their respective tasks and significantly contribute in the implementation of the Council's plans and programs. Taking up post graduate studies is becoming a norm for competency, including participation in trainings and other capability-building activities. Also in the year past, a number of gender-related activities were conducted in an effort to complete the whole spectrum of professional and personal development.

On-Going Studies

Part of the Council's human resource development plan is to encourage all staff to earn their BS, MS and PhD degrees. In 2012, seven (7) of PCIEERD's personnel embarked on their studies - 1 PhD in Biological Science, 2 in MS in Technology Management, 2 MS in Information Technology, 1 Master in Public Administration and 1 BS in Information Technology. The first 5 are under the Advanced S&T Human Resource Development Program (ASTHRDP) and the last two under PCIEERD's scholarship program.

Project Management Competency Development

Project management is one of the core functions of PCIEERD. While its technical personnel have developed a level of expertise on this area, continuing competency and skills training are conducted for the staff to keep abreast with new developments in this field. Towards the end of 2012, the PCIEERD technical personnel were trained by the UP-National Engineering Center (NEC) on Project Management which covered project initiation and governance, risk management, project planning (time and cost management), project monitoring and project closing.

PCIEERD's IT Presence

The PCIEERD has long proven the importance of ICT realizing that it has that power to enhance quality of life and in attaining several important ends: poverty alleviation, human development, and job creation. ICT is the enabler that allows nations, governments, businesses, and every Juan to become smarter being instrumented, interconnected, and intelligent with the use of data that is embedded in every IT instrument. ICT allows the interplay of technologies, information and people and with the ICT, it is nearly effortless to facilitate multi-disciplinary collaborations.

Such is the framework by which the PCIEERD builds up its IT capability and in making its presence felt among its partners, stakeholders and clientele and guided by its 2012-2014 Information Systems Strategic Plan (ISSP) endorsed by the National Computer Center (NCC) as the blueprint for IT initiatives in the Council.

As a merged Council, PCIEERD launched its new website on April 5, 2012 that features a wider range of sectors and activities like e-proposal submission, among others. It continues to maintain major Information Systems and its Intranet site in providing continuous service to PCIEERD's internal and external clients. It also upgraded its Dedicated Internet Access (DIA) service to 6 mbps fiber optic connection to accommodate the ever increasing demand for faster and more reliable interconnectivity. All other needed peripherals are being installed like deployment of new servers and workstations to host other services and upgrade existing ones, renewal of anti-virus software subscription for protection or security solution. In maintaining its IT capability, continuous preventive maintenance of ICT equipment as well as on-site and off-site data back-up and recovery for information systems and databases are regularly conducted.

Professor Adeline A. Pacia, Deputy Director of the UP-National Engineering Center (NEC) conducted the workshop on Project Management for PCIEERD last December 11-13, 2013 at the FNRI Training Room, Bicutan, Taguig.

Gender and Development (GAD)

The GAD focuses on the principle that development is for all. Everyone in society, no matter what gender, has the right to equal opportunities to achieve a full and satisfying life. (source: CSC website).

The PCIEERD has been actively pursuing GAD activities for its employees and ensuring that the GAD principle is applied in all its activities, from R&D, information dissemination, technology transfer, human resource development through scholarships and trainings.

In particular, the Council is aggressive in strengthening the implementation of the GAD program and the internalization of the GAD philosophy among its personnel and stakeholders. In 2012, several activities were conducted:

- Policy Framework on Gender Awareness and Development, May 11, 2012
- Sensitization on Gender Awareness and Development, June 19, 2012
- Gender from a Single's Perspective, November 16, 2012
- Briefing on GAD Need for GAD Mainstreaming to PCIEERD Management Team (PMT) which resulted to the establishment of the PCIEERRD GAD Network

Usapang PCIEERD

The Usapang PCIEERD is a monthly forum for a captive audience – all PCIEERD personnel. In the past, it was just a venue where employees could share with colleagues the knowledge and experiences gained from attendance to seminars and trainings here and abroad. Last year, the Usapang PCIEERD was revived and strengthened to include presentations and talks of invited experts on topics for 1) learning and knowledge enrichment, and 2) motivational and values formation. Other important issues affecting the employees were also tackled, among them: performance awards, GSIS retirement plans and benefits, Philhealth insurance and healthcare, and other employee benefits.

Building Teams for A Better Working Environment

In any organization, old or new, the interactions and relationships among personnel are always challenged to come up with the desired chemistry and performance. It is for this reason that team building activities are always conducted to improve how personnel would work within teams, where strengths are properly utilized while weaknesses are addressed.

The PCIEERD wrapped up the year with a team building activity held at the South Pick Resort in Mamplasan, Laguna on December 13-14, 2012. Most of the activities aimed at encouraging team members to spend time together, discover working together to approach a problem, analyze scenarios and discover better methods of communication including negotiation, leadership, and motivation to complete tasks and improve performance.

PCIEERD management and staff had a day of fun and learning during the Council's team building activity held at Sta. Rosa City last December 15, 2012.

Financial Management

2012 FINANCIAL REPORT

PCIEERD's budget for the year per the 2012 General Appropriation Act amounted to P595.852 M, which is 321% higher than FY 2011's budget of P141.5M. Personal Services (PS) and Maintenance and Operating Expenses (MOOE) accounted for 4.6% and 95.2% of the total budget, respectively. A P1M budget for capital outlay was also provided in 2012, which accounted for 0.2% of the total budget.

The bulk of PCIEERD's budget amounting to P595M is for grants-in-aid (GIA) to implement strategic programs and projects that are aligned with the priorities of the industry, energy and emerging technology sectors. Initiatives supported by PCIEERD GIA grants are for research and development, human resource development, capacity building, information dissemination and technology transfer, policy development and advocacy.

Additional budget of P11.995M under the Special Purpose Fund was also released in 2012 to cover requirements for salary adjustments, corresponding increase government share in insurance premiums and other personnel benefits. Continuing appropriations from 2011 amounted to P4.644M.

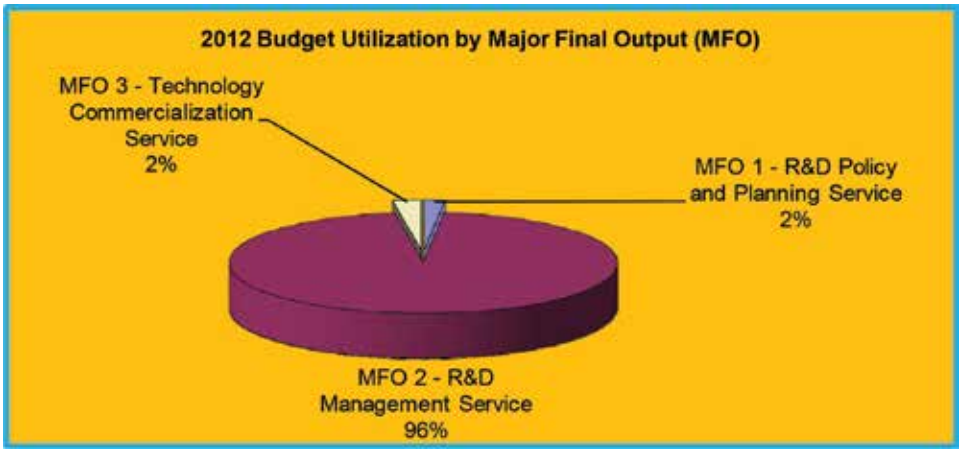
The Council utilized 99.9% of the funds allocated for the year.

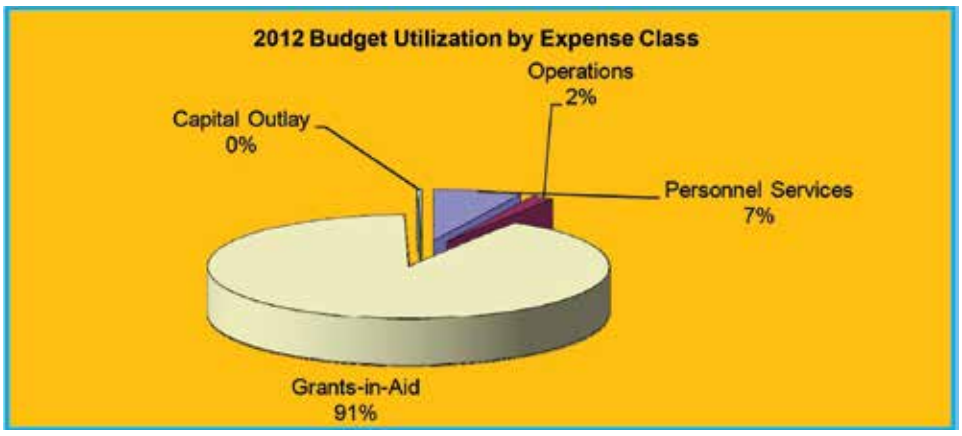
Trust Funds

In 2012, PCIEERD also received P876.833M from DOST and other agencies for the implementation of various projects and to cover expenses for monitoring and coordinating projects under the DOST GIA program.

Of this amount, P860.226M was released to UP Diliman for the Nationwide Disaster Risk and Exposure Assessment for Mitigation (DREAM) program and P5.590M was earmarked for the engineering and science components of the DOST's Accelerated S&T Human Resource Development Program.

Also received this year was a P2.549M grant from the US-Environment Protection Agency (EPA) as additional released for the 2nd year implementation of the project on capacity building on methane emissions recovery and utilization from landfills in the Philippines.





PCIEERD Governing Council

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MARIO G. MONTEJO
Secretary
Department of Science and Technology

Representatives from the Government Sector

DR. ROWENA CRISTINA L. GUEVARA
Executive Director
PCIEERD

HON. CARLOS JERICHO L. PETILLA
Secretary
Department of Energy

Alternate: Dir. Jesus T. Tamang

HON. ROGELIO L. SINGSON
Secretary
Department of Public Works and Highways

Alternate:Dr. Judy F. Sese

DR. WILLIAM C. MEDRANO
Commissioner
Commission on Higher Education

Alternate: Comm. Ruperto S. Sangalang

USec. MARIO L. RELAMPAGOS
Undersecretary
Department of Budget and Management

ATTY. ADRIAN S. CRISTOBAL
Undersecretary for Industry Development and Trade Policy Group and Managing Head, Bureau of Investments

Alternate: Dir. Ma. Corazon H. Dichosa

ASec. GEORGE D. ESGUERRA
Assistant Secretary for Planning
Department of Transportation and Communications

Alternate: Dir. Florencia A. Creus

Representatives from the Private Sector

DR. MARITA V.T. REYES
Clinical Professor
University of the Philippines Manila

DR. ALMA BELLA P. MADRAZO
Country Manager
AECOM

DR. ANTONIO B. VILLAFLOR
Quality Director
STMicroelectronics, Inc. Philippines

ENGR. ANICETO ABNER VILLAHERMOSA
Assistant Vice President
San Miguel Corporation (retired)

PCIEERD Management Team

DR. ROWENA CRISTINA L. GUEVARA
Executive Director
PCIEERD

ENGR. RAUL C. SABULARSE
Deputy Executive Director

ENGR. NIÑALIZA H. ESCORIAL
Chief
Industrial Technology Development Division (ITDD)

ENGR. DARWIN M. ROSALES
Chief
Energy and Utilities Systems Technology Development Division (EUSTDD)

ENGR. NELSON P. BENIABON
Chief
Emerging Technology Development Division (ETDD)

ENGR. ERMIE M. BACARRA
Chief
Human Resources and Institution Development Division (HRIDD)

ENGR. ALBERT G. MARIÑO
Chief
Policy Coordination and Monitoring Division (PCMD)

DR. VIRGINIA G. NOVENARIO-ENRIQUEZ
Chief
Research Information and Technology Transfer Division (RITTD)

MS. MARIDON O. SAHAGUN
Chief Administrative Officer
Finance and Administrative Division (FAD)

PCIEERD DIVISIONS

Office of the Executive Director (OED) and Office of the Deputy Executive Director (ODED)

The Office of the Director and Office of the Deputy Executive Director oversees the overall welfare of the agency as it sets the agency's strategic direction, formulates internal policies, and ensures implementation to attain goals and objectives.

From left: Rolly H. Pactores, Mark Daniel Forbes, Rolando A. Yanquiling, Maria Elena A. Talingdan, Richie P. Rodriguez, Dr. Rowena Cristina L. Guevara, Engr. Raul C. Sabularse, Mary Ann P. Magnaye, Jesusita C. Venturina, Aileen N. Luching

Industrial Technology Development Division (ITDD)

The Industrial Technology Development Division formulates an S&T plan, as well as, coordinates, evaluates and monitors R&D programs and projects relating to industrial processes, chemical foods and feeds, textiles and wood-based sectors, metals and engineering, mining and minerals and environment sectors.

From left: Kristina Paula Y. Anacleto, Grace F. Estillore, Kasmir G. Iyo, Katrina B. Landicho, Fatima Jhoan S. Ibarreta, Mary Grace G. Buenavides, Ronaldo Q. Dominguez, Engr. Niñaliza H. Escorial (seated), Cristina Mae S. Ilaw, Myrna M. Blah, Paula Jean T. Cansino, Russel M. Pili, Aleah M. Penilla, Liz Ahren C. Peñaflor, Laarni T. Piloton

Energy and Utilities Systems Technology Development Division (EUSTDD)

The Energy and Utilities Systems Technology Development Division formulates an S&T plan, as well as, coordinates, evaluates and monitors R&D programs and projects relating to energy conservation, conventional and non-conventional sources of energy. Construction and infrastructure, and transportation sector.

From left: Loreto C. Carasi, Ma. Monina Hazel B. Garcia, Patrick E. Montero (seated), Emelita A. S. Dimapilis, Raymundo H. Habal, Alma C. Dupagan, John Croomwell M. Manalo (seated), Rachel R. Habana, Nonilo A. Peña (seated)
Not in photo: Darwin M. Rosales, Ryan Christopher P. Viado, Carminda Tandelcarmen

Emerging Technology Development Division (ETDD)
The Emerging Technology Development Division formulates an S&T plan, as well as, coordinates, evaluates and monitors R&D programs and projects on emerging technologies including biotechnology, genomics, materials science/nanotechnology, information and communications technology, photonics and space technology applications.

From left: Diana Marie D. Jimenez, Marietta M. Valdez, Joanna Rose Guardiano, Ruth A. Gonzales, Laarni P. Habal, May-Rose B. Pariñas, Darwin V. Santos (seated), Desiree D. Vera, Meraida D. Reyes, Engr. Nelson P. Beniabon (seated) Jezzel R. Jao, Janina Catrina Fuentes, Clarinda G. Reyes, Mary Joy C. Buitre, Edna C. Nacianceno

Human Resource and Institution Development Division (HRIDD)
The Human Resources and Institution Development Division formulates plans as well as evaluates, monitors and implements programs and projects intended to develop capability of human resources and institutions to undertake R&D in industry, energy and emerging technology.

From left: Marie Christie B. Santos, Engr. Ermie M. Bacarra, Arnel Bisnar, Annaliza R. Monterey, Jonathan G. Muñoz, Leonila P. Valdez

Policy Coordination and Monitoring Division (PCMD)

The Policy Coordination and Monitoring Division assesses and coordinates the plans of the Council's divisions and monitor their implementation for consistency with the overall policy of the Council.

From left: George D. Monroyo, Mary Jane S. Dabela, Carlota P. Sancho, Ulysses M. Palmones, Magdalena F. Frando (seated), Joseph R. Escorial, Engr. Albert G. Mariño (seated), Ruel A. Pili, Arlene A. Romasanta, Marcus Paolo C. Patam, Marivic A. Legista

Research Information and Technology Transfer Division (RITTD)

The Research Information and Technology Transfer Division is in charge of providing the mechanisms for developing plans, programs and strategies for the diffusion as well as information dissemination, promotion and advocacy for the technologies generated from DOST-funded projects. It also provides the mechanism for developing and implementing plans and programs to hasten the utilization and commercialization of technologies generated from DOST-funded R&D projects.

From left: Efren V. Reyes, Jorimay K. Pilapil, Dr. Virginia N. Enriquez (seated), Brian James S. Aggangan, Janet Rosalie Ann H. Polita, Raissa Roa L. Aguilera

Finance and Administrative Division (FAD)

The Finance and Administrative Divisionprovides the Council with efficient and effective services relating to personnel administration, cash, supply and property management, communications and records management, budgeting and accounting.

From left, seated: Rodolfo A. Veloso, Maridon O. Sahagun, Sonia P. Cabangon, Nomer T. Evangelista
Standing from left: Alex R. Gesmundo, Emmeric. C. Quema, Aileen L. Ventura, Charlemagne P. Valdez, Pancho A. Certeza, Allen Z. Manibog, Marissa G. Dalay, Jayson Ryan G. Salunson, Chingky N. Silvederio, Divina B. Almazar, Sonia S. de Leon Ricardo G. Palad, Jr., Maryann F. Bangunan, Anthony Dela Cruz, Julieta H. Lacsa, Ena R. Conde, Joselito B. Velasquez, Mildred F. Cabradilla, Rommel V. Bisperas, Vilma Rosa C. Borja, Elaine Annette C. Salma, Isidro V. Querubin, Jr.

PCIEERD Management and Staff

Appendices

Name	Training/Seminar Attended	Date	Venue
AGUILERA, Riassa Roa L. ENRIQUEZ, Virgnia N. PENILLA, Aleah M. ROCES, Myra Cyril M.	"IPOPHIL Orientation on Thomson Reuter Innovation Database TRID)"	January 19, 2012	University of Santo Tomas (UST) Library Computer Room, España Manila
MUNOZ, Jonathan G	Open Seminar on "Industrial Applications of Radiation Technology"	January 30, 2012	Ipil Function Room of Bayview Park Hotel, Roxas Blvd., Manila
BANGUNAN, Mary Ann F.	"DOST HRDP In-House Training on Government Procurement"	February 15-16, 2012	DOST Executive Lounge, DOST Compound, General Santos Ave., Bicutan Taguig City
PILOTON, Laarni T. CANSINO, Paula Jean T.	PIcHE National Convention	February 15-17, 2012	Surigao City
ROCES, Myra Cyril M.	1st National Coconut Sap Sugar Congress, Handog ay Kaunlaran at Kalusugan sa Pamayanan	March 5-6, 2012	Marco Polo Hotel, Davao City
ROMASANTA, Arlene A. ROSALES, Darwin M.	79th NRCP General Membership Assembly and Scientific Paper Conference/Policy Forum	March 6-7, 2012	Sofitel Hotel, PICC Complex, Pasay City
CONDE, Ena R.	Seminar-Workshop on RA 9470 and Basic Records and Archives Management	March 6-8, 2012	Heritage Hotel, Roxas Boulevard cor. EDSA Pasay City
ENRIQUEZ, Virgnia N. IYO, Kashmir G.	Training Workshop for RTEC Members and Other Stakeholders on the Application of TNA Protocol	March 26-28, 2012	FNRI Bldg. Gen. Santos Ave. Bicutan Taguig City
BACARRA, Ermie M. HABAL, Laarni P. NACIANCENO, Edna C. VERA, Desiree D. BUENAVIDES, Mary Grace D.	27th Philippine Chemistry Congress	April 11-13, 2012	EDSA Shangrila Hotel
CABRADILLA, Mildred F. VISPERAS, Rommel V.	Training/ Workshop on Government Manpower Information System (GMIS)	April 11-13, 2012	Hotel Veniz, Baguio City
ESTILLORE, Grace F.	14th Philippine Quality Award (PQA) Forum	April 17, 2012	Meeting Room 5, Philippine Internationa; Convention Center, Roxas Blvd. Manila
SABULARSE, Raul C.	Future of Renewable Energy in the Philippines: Alternative Solutions to Rising Power Cost	May 10, 2012	Asian Institute of Management (AIM) Conference Center, Benavidez St., Makati City
BANGUNAN, Mary Ann F. SILVEDERIO, Chingky N.	"34th GACPA Annual Convention: Enhancing the Culture of Integrity, Accountability and Transparency"	May 16-18, 2012	Grand Ballroom, Punta Villa Resort, Sto. Niño Sur, Arevalo, Iloilo City
MUNOZ, Jonathan G.	e-Government Project Management	May 21-25, 2012	NCC, National Computer Institute, UP Diliman Quezon City
NACIANCENO, Edna C. SANTOS, Darwin V. AGUILERA, Riassa Roa L. POLITA, Janet Rosalie Anne H. CABRADILLA, Mildred F. ESTILLORE, Grace F. ESCORIAL, Joseph R. FRANDO, Magdalena F	Internal Customer Satisfaction Survey & Customer Complaint Management based on ISO 10002:2004	May 21 & 25, 2012	DOST Executive Lounge, DOST Compound, General Santos Avenue, Bicutan, Taguig City

Name	Training/Seminar Attended	Date	Venue
VIADO, Ryan Christopher P. HABANA, Rachel R. PILI, Russell M.	"DOST HRDP In-House Training on BASIC STATISTICAL ANALYSIS FOR RESEARCH AND DEVELOPMENT"	May 28-31, 2012	DOST Executive Lounge, DOST Compound Gen. Santos Ave. Bicutan Taguig City
ESTILLORE, Grace F.	PQPMI Forum	June 5, 2012	MetroClub Rockwell MakatiCity
MONTERO, Patrick E.	Engineering a Safe & Better Nation Through Excellence in Electrical Profession	July 5-6, 2012	Antipolo City & Ortigas Avenue Pasig City
LEGISTA, Marivic A.	PHP/ MySQL for Beginners	June 20-22, 2012	ASTI - DOST, Diliman, Quezon City
ENRIQUEZ, Virgnia N. AGUILERA, Raissa Roa L. DELA CRUZ, Marvin Eric O.	Seminar on Patent/ UM Registration Application Documentation and Patent Search using Patentscope	June 25-26, 2012	DOST- TAPI Audio Visual Room
SANTOS, Darwin V.	"Wi-Max & GPON Infrastructure"	June 26-28, 2012	AFP Golf Club, Gate 3, Camp General Emilio Aguinaldo, Quezon City
IYO, Kashmir G. ANACLETO, Kristina Paula Y. IBARRETA, Fatima Jhoan S.	51st PAFT Annual Convention: Philippine Food Technology: "The Safe Advantage"	July 25-27, 2012	SMX Convention Center, MOA Complex, Pasay City
CABRADILLA, Mildred F.	POAP: Strategic Planning with HR Planning	August 7-10, 2012	Apo View Hotel, Davao City
SALUNSON, Jayson Ryan G.	COA: Understanding and Updates of Government Procurement Systems (RA 9184)	August 15-17, 2012	E. Rodriquez Sr. Avenue, New Manila Quezon City
POLITA, Jannet Rosalie Anne H. ROMASANTA, Arlene A.	Training of Technical Advisers on Gender Analysis (TOTAGA) for provincial Science and Technology Directors and GAD Focal Persons	August 29-31, 2012	Punta de Fabian, Barras, Rizal
MARIÑO, Albert G.	Government Chief Information Officer (gCIO) Program	Module 1 : September 19-21, 2012 Module 2 : October 24-26, 2012 Module 3 : November 21-23, 2012 Module 4 : December 12-14, 2012	Development Academy of the Philippines (DAP), Tagaytay City
BACARRA, Ermie M. ESCORIAL, Joseph R. MUÑOZ, Jonathan G. POLITA, Jannet Rosalie Anne H. JAO, Jezzel R. FUENTES, Janina Catrina H.	PHILAAS 61st Annual Convention "Smart Technologies for Global Competitiveness"	September 13-14, 2012	Audio Visual Room, Mapua Institute of Technology (MIT)
PILI, Russell M. ROCES, Myra Cyril M.	1st Philippine Rubber Investment and Market Encounter (PRIME 2012): " Bridging Opportunities for Inclusive Growth"	September 18-19, 2012	Holiday Inn, Clark, Angeles City, Pampanga
CONDE, Ena R.	Basic Records Management & National Inventory Records and Archives	October 4, 2012	Great Eastern Hotel, 1403 Quezon Avenue, Quezon City
CABANGON, Sonia P. MANIBOG, Allen Z.	AGIA: Annual National Convention cum Seminar " Strengthening Partnership Towards Synergy, Transparency and Accountability"	October 10-12, 2012	Tagbilaran City, Bohol
ANACLETO, Kristina Paula Y.	12th Course on Food Safety	October22-26, 2012	Press Room, College of Public Health, University of the Philippines, Manila

Name	Training/Seminar Attended	Date	Venue
SALMA, Elaine Annette C. VENTURA, Aileen L.	AGAP Accounting, Budgeting and Calculating Risk: Factors which Government Must Deal With	October 24-27, .2012	Lahug, Cebu City
VELASCO, Naason G.	14th Samahang Pisika ng Visayas at Mindanao National Physics Conference	October 25-27, .2012	University of Cebu, Maritime Education & Training Center, Cebu City
DIMAPILIS, Emelita AS	ASEAN Biofuel Roadmap Workshop	October 16-18, 2012	Malaysia
POLITA, Jannet Rosalie Anne H. MACEDA, Margarette T. TALINGDAN, Ma. Elena T. MONTA, Mary Grace B.	DOST Branding and DOST Mediacore National Conference	October 22-23, 2012	Dumaguete City
HABAL, Laarni P. VERA, Desiree D.	41st Annual KKP-ST Convention	October 26-27, 2012	Makiling Heights Pansol , Calamba, Laguna
IYO, Kashmir G.	"APO E-Learning Course on Food Safety and Traceability"	Novembet 6-8, 2012	DAP, Pasig City
PILI, Ruel A. QUERUBIN, Isidro V. Jr. ALMAZAR, Divina B.	"Bottom-up Planning & Budgeting: Empowering People from Below"	November 7-10, 2012	L' Fisher Hotel, Bacolod City
MARIÑO, Albert G. ESCORIAL, Niñaliza H. ROSALES, Darwin M. SAHAGUN, Maridon O.	Training Program on Strategic Planning	November 12-14, 2012	CSI Training Room, 4th Flr. CSC Building, Constitution Hills, Diliman QC
LACSA, Julieta H. QUEMA, Emmeric C.	COA: Laws and Rules on Government Expenditures- National/ Corporate	November 13-16, 2012	COA, Quezon City
REYES, Clarinda G. BUITRE, Mary Joy C.	1st Philippine Geomatics Symposium (PhilGEOS 2012) "Philippine Geomatics: practices, applications and accomplishments"	November 23-24, 2012	College of Engineering, UP Diliman, Quezon City
ESCORIAL, Joseph R. SANTOS, Darwin V. LANDICHO, Katrina B. HABAL, Raymundo H. ANDRES, Consuelo N.	In-House Training Workshop on "Supervisory Development Course"	November 26-29, 2012	FNRI Training Room. DOST Compd. Gen. Santos Ave., Bicutan Taguig City
ALL PCIEERD Personnel	Project Management Training	December 11-13, 2012	FNRI Training Room, 3rd Floor FNRI Bldg. Taguig, Bicutan City

Name	Training/Seminar	Date	Venue
CARASI, Loreto C.	1st IOC/Westpac Workshop on the Status on the Marine Renewable Energy Technology Development in the Western Pacific	February 16-18, 2012	Malacca City, Malacca Malaysia
HABANA, Rachel R.	Capacity Building in Landfill Gas Utilization in ASEAN: Landfill Gas Application Workshop	March 6-8, 2012	Bangkok, Thailand
ESCORIAL, Niñaliza H. ESTILLORE, Grace F.	Observational Study Mission on Business Excellence	March 26-30, 2012	Malaysia
ESTILLORE, Grace F.	ISTIC Training Workshop on Science, Technology and Innovation (STI) Policy Development-Technology Management for Socio Economic Transformation	June 11-15, 2012	Malaysia
BUENAVIDES, Mary Grace G.	Visit to Korea Research Institute for Standards and Science (KRISS) and the Korea Advance Institute for the Science and Technology (KAIST)	August 6-9, 2012	Korea
ESCORIAL, Niñaliza H.	Public Session and Workshop on Regional and Bi-Regional S&T Cooperation in Support of Innovation Systems in ASEAN	August 7-10, 2012	Bandung, Indonesia
SABULARSE, Raul C.	APEC Workshop on Climate Change Adaptation in the Asia Pacific: Remote Sensing and Modeling Tools for Better Planning	August 16-17, 2012	Singapore
ROSALES, Darwin M.	International Training Workshop on Technological Innovation for Small and Medium-sized Enterprises Based on Science and Technology	September 15-26, 2012	Beijing
PEÑA, Nonilo A.	Research and Innovation (R21) in Green Technology and Food Security Workshop, International Techmart	September 20-21, 2012	Hanoi, Viet Nam
ESTILLORE, Grace F.	Bench Marking Activity under the DOST SETUP project entitled, "Enhancing the Capability of DOST to Support the Development of the Philippine Food Processing Industry Through a Study Visit"	September 30 to October 6, 2012	Bangkok, Thailand
SABULARSE, Raul C.	Learning Visit	October 14-19, 2012	Seoul, Korea
DIMAPILIS, Emelita AS	ASEAN Biofuel Roadmap Workshop	October 16-18, 2012	Malaysia
CARASI, Loreto C.	Experts Workshop on Renewable Energy	November 4-7, 2012	New Delhi, India
SABULARSE, Raul C.	China ASEAN Seminar on Space Information Products Sharing in Disaster Risk Reduction	November 4-7, 2012	Beijing, China
ENRIQUEZ, Virginia N.	World Innovation Forum	November 5-7, 2012	Kuala Lumpur, Malaysia
VIADO, Ryan Christopher P.	Workshop on Strengthening South-South Cooperation on Science and Technology to Address Climate Change	November 10-12, 2012	Guangzhou, China
GUEVARA, Dr. Rowena Cristina L.	Special Workshop to develop an Implementation Plan for the Krabi Initiative	November 27-28, 2012	Brunei Darussalam

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