Session 4
Examples of Public-Private Partnerships: In the Area of Nuclear Technology: Malaysian Experience

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**NUCLEAR MALAYSIA (NM) CORE BUSINESS**

**RESEARCH & TECHNOLOGY DEVELOPMENT**

**TRANSFER & COMMERCIALIZATION of TECHNOLOGY**

**Product**

**Services**

**Main Complex**

**Technology Park**

**TECHNICAL & CORPORATE SUPPORT**

**Snapshot of NM Activities**

- Centre of Excellent (COE) for PROTON in Automotive (since 2016)
- COE for CTRM in Recycling of Aviation Carbon Fiber (since 2017)
- IAEA Collaborating Centre (ICC)
  - Non-Destructive Testing (2017)
  - Radiation Processing of Natural Polymer and Nano-materials, (2010 – 2020)
  - Radiation processing of natural polymer (2006 to 2009)
- CRP project on The development of 3D tissue scaffolds for tissue engineering application via micro-stereolithography technique (2014-2018)
- RCA project on Supporting radiation processing for the development of advanced grafted materials for industrial applications and environmental preservation, RAS1014, (LCC for 2013 -2017)
PPP Approach Towards Commercialization of Nuclear Technology at Nuclear Malaysia

- Licensing of patent & royalty
- Incubator program (start-up company operated Nuklear Malaysia facility/plant/laboratory (e.g. tissue culture lab, GMP plant for radioisotope production, GMP hydrogel)
- Building/plant Rental
- Joint R&D & Pre-commercialization Project (Flagship/Technofund funded)
- Services Agreement (e.g. irradiation services, testing)
- Technical support and
- Consultation
Some PPP Project Undertaken by Nuclear Malaysia with Industry
Radiation Modified Starch Hydrogel
Nuclear Malaysia & Rumbia Biotech

- Licensing of starch hydrogel patent
- Incubator program
- Technical support and consultation

Ebeam crosslinking & Sterilization Process
Scalding from hot water: complete healing after one month used of sago hydrogel

Products
PPP Activities:
technology transfer on plant tissue culture
Nuklear Malaysia - Hexagon Green: Commercial Production of Orchid Tissue Culture Seedlings

Scopes;

i. Consultancy service on plant tissue culture and bioreactor technology for mass production of plant seedlings

ii. Staff attachment/hands-on course on orchid propagation and maintenance in a commercial nursery

iii. Mass propagation and pre-commercialization of orchid mutants for cut flower industry (MOSTI TF 0110C033)

Selected orchid mutants for pre-commercialization studies

*Keena Oval*  
*Keena Radiant*  
*Keena Ahmad Sobri*  
*Keena Hieng Ding*  
*Keena Pearl*

*Keena Pastel*  
*Lace*  
*DS 35 1J*  
*DS 35N*
Nuklear Malaysia - Dut Nusa Jaya: Pre-commercialisation of LED lighting technology for Stevia plant tissue culture production (MOSTI TF0614D122)

Scope of collaboration:
1. Consultancy service on setting up a pre-commercial plant tissue culture production facility
2. Use of LED lighting & plant tissue culture technology for rapid plant production
3. Consultancy service on the micro propagation of selected stevia variant developed by Nuclear Malaysia
4. Mass propagation of stevia seedlings for large scale commercial plantation

Nuklear Malaysia – KOSAS: Large scale production of MD2 pineapple using bioreactor technology
Scope of collaboration:
1. Consultancy service on the large scale production of MD2 pineapple using bioreactor technology
2. Hands-on training on the micro-propagation and transplanting of the MD2 pineapples in nursery and farm
OTHER PROJECTS

TLD Dosimeters for Radiation Workers in Malaysia
Nuclear Malaysia & APM (1995 until now)

Commercialization of Chitosan Oligomer as Plant Promoter/Elicitor

PrOligomer®

Content Specifications:
- Oligomer content > 95%
- Molecular weight < 150kDa
- Degree of Acetylation > 90%
- pH: > 10
- Trace Element: < 5 ppm

Form: Liquid

Price: RM40/LITER


Project Code: TF 0911B222.

In vitro propagation of Banana (Musa sp.)

Field planting

Temporary Immersion Bioreactor System

In vitro plantlets

Air Lift Bioreactor

Nuclear Malaysia & APM

Other Projects

Commercialization of Chitosan Oligomer as Plant Promoter/Elicitor
HIGH IMPACT PPP DEVELOPMENT PROGRAM FOR ENHANCING SAFETY OF AUTOMOTIVE AND BUILDING WIRE & CABLES USING ADVANCED MATERIAL AND GREEN TECHNOLOGY

PROGRAM AIMS:

Development of Radiation Crosslinked Cable and Radiation Crosslinked Flame Retardant (FR) for Automotive (including Hybrid and EV Cars) and Building Cable In Collaboration with PROTON Holding Berhad and Wonderful Ebeam Cable Sdn Bhd
Monthly Product Capacity

1. XLPE/SWA/PVC ARMOURED CABLES  COPPER CONSUMPTION  LENGTH
2. XLPE/PVC SHEATHED CABLES  350 metric tons
3. PVC/SWA/PVC ARMOURED CABLES
4. PVC/INS & PVC/PVC CABLES
5. PVC FLEXIBLE CABLES AND CORDS  350 metric tons
6. PVC FLAT TWIN CABLES
7. PVC AUTOMOBILE CABLES
AV, AVS, AVSS, CAVS, AVX & AEX EB & HEB Type  150 metric tons  50,000 KM
8. IGNITION CABLES
9. UL WIRES  15 metric tons
10. PVC APPLIANCE WIRES  15 metric tons  30~50 KM
11. COAXIAL CABLES
12. SPEAKER CABLES
13. INTERNAL TELEPHONE CABLES
14. SCREENED/SHELDED CABLES  30 metric tons

FR/Flame Testing
SCOPE OF PPP: PRODUCTION PROCESSES FOR EB CROSSLINKED CABLE

PROCESS FLOW

1. Plastic Resin/FR/Additives Processing aid (IPR & KNOW-HOW)
2. Mixing
3. Compounding
4. E-Beam CROSSLINKING
5. Extrusion
6. Testing & Certifications

NUCLEAR MALAYSIA

WONDERFUL
ELECTRON BEAM (EB) PROCESS at NUCLEAR MALAYSIA—For Type AEX (PE Cross Link) & AVX (PVC Cross Link) Wires.
PARTNERSHIP SCOPE AND ARRANGEMENTS

- Technical support on material/compound
- Irradiation service contract
- PFI on ELV-4 accelerator
- Technical Agreement on High Impact (HIP) project in collaboration with PROTON (auto maker) & Wonderful Ebeam Cable
- Technical support and consultation in funding request
- Technical support on market reach and customer feedback
- Licensing of patent
- Development of standards and test methods
K-ECONOMY FOR SUSTAINABLE ECONOMIC DEVELOPMENT VIA STI

Country Needs:
- New technology
- New process
- New product

Country Wealth:
- Crosslink cable
- Localization
- FOREX saving

Why important?
CHALLENGES AND LESSONS LEARNED

- Convincing local technology is as good as imported products
- Market Dominance & Monopoly (Foreign players)
- Acceptance of Nuclear Technology
- Financing in-house EB accelerator to reduce operation cost
- Maintenance to ensure continuous facility uptime (e.g. Ebeam)
- Higher irradiation cost (not dedicated facility)
- Government procedures/Bureaucracy
Thank You for Your Attention