

Energy Technology and Energy Sector Resiliency











June 26, 2018 Bonifacio Global City Taguig City



PRESENTATION OUTLINE

- What is Energy technology and innovations?
- 2. Importance of Energy Technology and Innovation
- DOE Alternative Fuels and Emerging Technology Programs & Initiatives
- 4. The technology and innovations process
- Barriers to Technology and Innovation Development
- 6. Financing Energy Technologies and Innovations
- 7. Way Forward





What is Emerging Technology?

June 26, 2018 Bonifacio Global City Taguig City



What is "emerging technology"?

Emerging technologies are technologies that are perceived as capable of changing the status quo. These technologies are generally new but include older technologies that are still controversial and relatively undeveloped in potential.

Emerging technologies are those technical innovations which represent progressive developments within a field for competitive advantage

[International Congress Innovation and Technology XXI: Strategies and Policies Towards the XXI Century, & Soares, O. D. D. (1997)]

Energy Technology are technology that promotes, enhances, or expands the diversity of available energy supply sources or means of transmission, increases energy efficiency, or reduces negative energy-related environmental effects: "energy technology" includes technology related to renewable sources of energy, conservation of energy, enabling technologies, efficient and effective use of hydrocarbons, and integrated energy systems



Importance of Emerging energy technology and innovations

June 26, 2018 Bonifacio Global City Taguig City



Why should we embrace the adoption of Emerging Energy Technology and Innovation in the Philippine energy sector:

- ➤ Unique challenges in climate and geography
- > Substantial diversity of natural resources but lacks the oil resource
- > Energy security issues
- > Limited funding and investment opportunities

Emerging Energy Technology and Innovation can Present Solutions to:

- > Reduce the costs of energy end-use forms to consumers
- ➤ Reduce costs of energy services and products by increasing enduse efficiency
- > Reduce dependence on imported oil
- > Increase the reliability and resiliency of energy systems
- ➤ Increase productivity of economic sector (industrial, commercial, agriculture and services)
- > Reduce emission of pollutants related to energy use





DOE Alternative Fuels and Emerging Technology Programs & Initiatives

June 26, 2018 Bonifacio Global City Taguig City



Achieving energy security while meeting environmental challenges through the utilization of alternative fuels and emerging energy technologies

Alternative Fuel Vehicles (AFVs)



Compressed Natural Gas (CNG)



Initiatives:

- Performance Testing of AFVs
- Prototyping of PNS compliant **AutoLPG Jeepney**
- Capacity building through development of technician's training module for AFV repair and maintenances
- Development of emergency response protocol for AFVs
- Development of policies for the development of support infrastructure such as:
 - EV Charging stations
 - AutoLPG/CNG refilling stations
- Legislative advocacy to provide incentives for AFVs



Electric & Hybrid Vehicles



AutoLPG and Electric Jeepneys





DOE Alternative
Fuels and Emerging
Technology
Programs &
Initiatives

June 26, 2018 Bonifacio Global City Taguig City

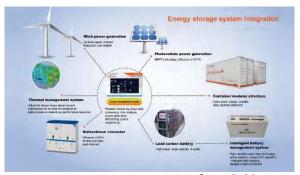


Achieving energy security while meeting environmental challenges through the utilization of alternative fuels and emerging energy technologies

Innovation and Emerging Technologies



Electricity from human kinetics



Battery Energy Storage System for Reliable Power Distribution System



Waste tire/plastic recycle to oil
Alternative Fuel derived from waste rubber and
plastics



Grass-based biomass fuel (Bugang/Napier) for domestic cooking to address deforestation and reduce indoor pollution





Ethanol Production from Pineapple leavesfor Automobile Fuel



LPG-powered farm equipment to avoid fuel spillage and reduce emission



Use of Smart controls and sensors at home for energy savings



Use of FAST Electric Vehicle Charger will encourage use of EV for cleaner alternative



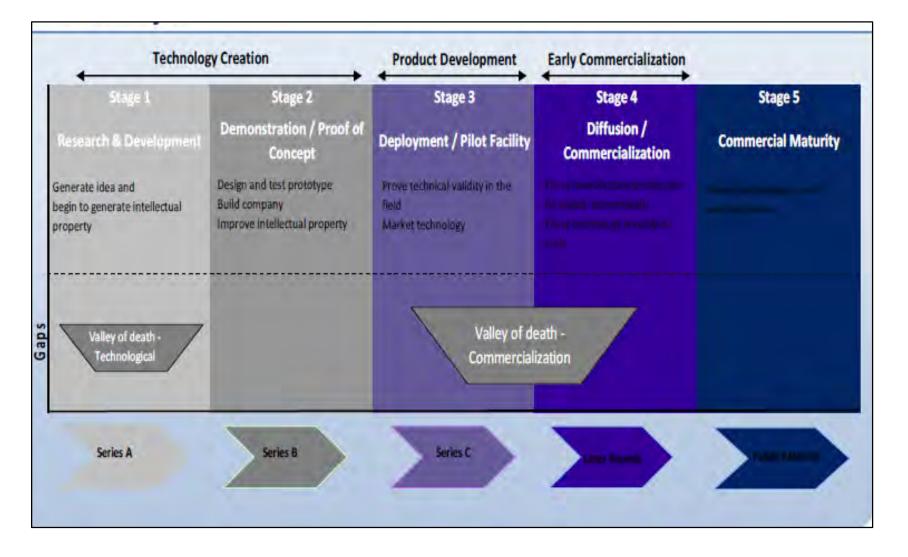


The process of commercialization of technology and innovations

June 26, 2018 Bonifacio Global City Taguig City



General Stages of Technology and Innovation Development:





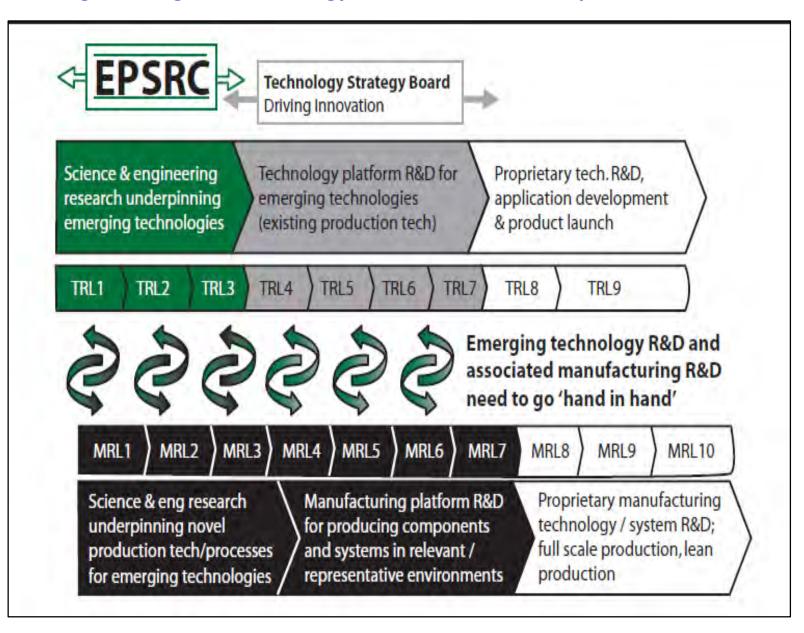


The process of commercialization of technology and innovations

June 26, 2018 Bonifacio Global City Taguig City



United Kingdom Stages of Technology and Innovation Development:







The process of commercialization of technology and innovations

June 26, 2018 Bonifacio Global City Taguig City



US-DOE Stages of Technology and Innovation Development:

Pre-Acquisition	Conceptual	Des	sign/Constructi	on	Acceptance	Operation
R&D Input	Permit Requirements Facilities Scope	Preliminary Design Project Authorization Project Schedule Facility Scope	Final Design Source Documents	Construction Construction Permits	Startup Testing Verification of Performance	Project Closeout
Facility Feedback	Facility Feedback	Facility Feedback	Facility Feedback	Construction Feedback	† 1	A
Input Assessments and Studies	R&D Input	Engineering Engineering Engineering Development Development • Full-Scale Test		Process Support		
Review of Alternatives	Proof of Concept Testing	Process Refinement and Optimization Engineering-Scale Test Integrated Runs			Startup Support	Continuous Improvement
Small-Scale Testing						
Safety Strategy Input						
Process Needs Identification Selection		Performance Verification			Plant Support	

Technology Development Phase





The process of commercialization of technology and innovations

June 26, 2018 Bonifacio Global City Taguig City



Philippine DOST Harmonized National Research and Development Agenda 2017-2022

R&D Priority Areas and Programs

National Integrated Basic Research Agenda (NIBRA)

WATER SECURITY

- Watershed studies, water quality, accessibility and availability
- FOOD AND NUTRITION SECURITY
 - · Food safety, biodiversity studies

. HEALTH SUFFICIENCY

- Fundamental studies on potential sources of natural products, basic veterinary studies, social dimensions on health
- CLEAN ENERGY
 - · Alternative energy

SUSTAINABLE COMMUNITIES

 Vulnerable ecosystems, data analytics on natural phenomena, environmental and anthropogenic activities

. INCLUSIVE NATION-BUILDING

 Documentation of indigenous knowledge, data collection on social phenomena, education, national security and sovereignty, arts, history and culture

Health

- Drug Discovery and Development
- Diagnostics
- Functional Foods
- Hospital Equipment and Biomedical Devices
- Information and Communication Technology for Health
- Dengue
- Nutrition and Food Safety
- Disaster Risk
 Reduction Health
- Climate Change
 Adaptation Health
- Omic Technologies for Health

Agriculture, Aquatic and Natural Resources Sector (AANR)

AGRICULTURE

Crops

Germplasmresearch; Varietal improvement and selection; Good quality planting materials (QPMs); Cultural management and crop production systems;

•Prototyping
•Pilot-scale Testing
•Technology Validation
•Field Testing

•Intellectual Property (IP) Valuation and Technology Licensing/Negotiation

Autrition, feede and feeding systems; Postharvest handling, processing and product development, Automation of feeding, water and culture management and post production; Piahkili, warning and mitigation systems and environmental management, Management of feheries

FORESTRY

 Development and sustainable management of tree plantations, HYV development of priority timber species, Production protocols for the production of QPM, Sustainable cultural management practices, harvesting and postharvest techniques and marketing strategies

NATURAL RESOURCES AND ENVIRONMENT

Biodiversity, Watershed management and utilization, Soli management and rehabilitation, Agricultural and forest waste-based product development, Climate change strategies and decision support tools, Resource assessment and monitoring, Habitat management, Marine environmental management, Innovative systems for unique landscapes and ecosystems

TECHNOLOGY TRANSFER

 Upscaling of technology transfer and commercialization, New and innovative extension modalities; Technology business incubators SOCIO-ECONOMICS AND POLICY RESEARCH Industry, Energy and Emerging Technology

- Food and Nutrition Security
- Countryside Development
- Competitive Industries
- Delivery of Social Services
- Intelligent Transportation Solutions
- Renewable Energy and Energy Storage Solutions
- Human Security

Disaster Risk Reduction and Climate Change Adaptation (DRR CCA)

- Observation and Monitoring Networks
- Technology Development and Application for Monitoring
- Modelling and Simulation for Improvement of Monitoring and Forecasting
- Hazards, Vulnerability and Risk Assessment
- Warning and Risk Communication
- Technology Development and Application for Climate Change Mitigation and Adaptation
- Technology Development and Application for Disaster Risk Management
- Policy Research





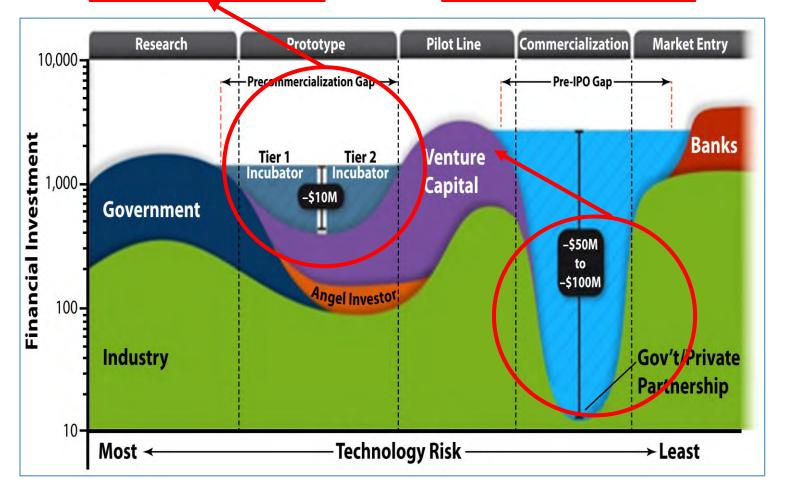
Barriers to
Technology and
Innovation
Development

June 26, 2018 Bonifacio Global City Taguig City





Commercialization Valley of Death







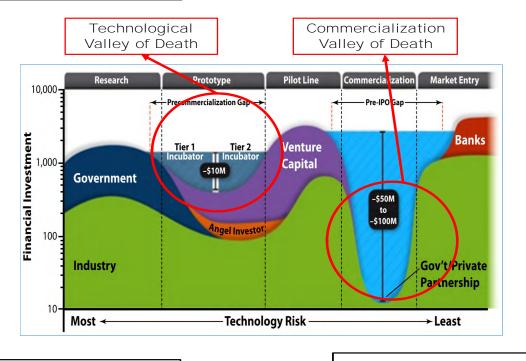
Financing the
Commercialization
of Energy
Technologies and
Innovations

June 26, 2018 Bonifacio Global City Taguig City



Government as a First Adopter

Technology Funds



ASIAN GREEN BONDS

Intellectual Property/Royalty

Venture Capital

Commercial Loan/Green Loan Portfolio

Angel Investor





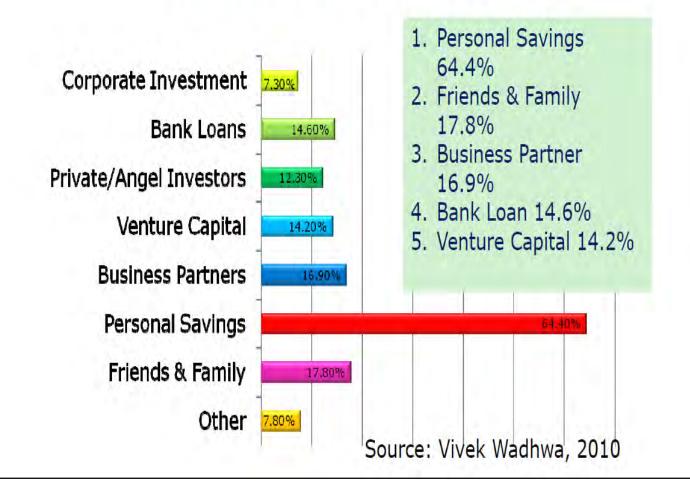
Financing the
Commercialization
of Energy
Technologies and
Innovations

June 26, 2018 Bonifacio Global City Taguig City





Personal Funds are the Norm

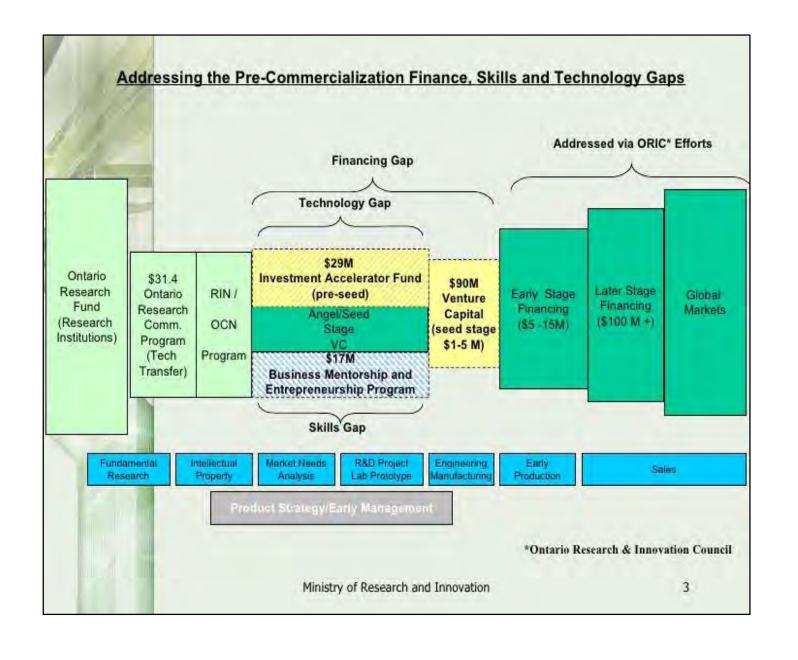






Financing the
Commercialization
of Energy
Technologies and
Innovations







Financing the
Commercialization
of Energy
Technologies and
Innovations

June 26, 2018 Bonifacio Global City Taguig City











Alternative Fuels Program

Available GAA Funding to support the following activities fro promoting the adoption of energy technology and innovation:

- 1. Basic Research and Development
- 2. Technology Validation
- 3. Technology Performance Testing
- 4. Technology Prototyping,
 Demonstration and Pilot Testing
- 5. General Information Education and Awareness Campaign





Lessons Learned

June 26, 2018 Bonifacio Global City Taguig City



U.S. Strengths in Innovation

- Government investments in R&D: ~\$150B a year
- Private investments in R&D: ~\$270B a year
- Research Universities: some with a culture of innovation
- Entrepreneurial spirit and laws to support it
- Talent: from the U.S. and from around the world
- Capital: Broad, deep, and efficient capital markets with significant angel (\$22.5 Billion*) and venture funding (\$28.4 Billion**)
 - Sources:
 - * Jeff Sohl, UNH Center for Venture Research
 - ** 2012 Money Tree Report

Other advanced countries are aggressively reforming their economies

Improving the performance of the innovation system as a whole by:

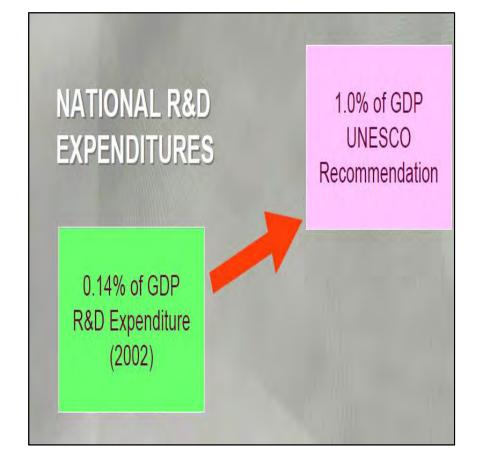
- Reducing the cost (and red tape) of doing business
- Strengthening linkages between universities and companies
 - Providing incentives for universities to commercialize and cooperate with the private sector
- Providing early stage financing



Lessons Learned

E DOWED HE
E-POWER MO
E-SAFETY MO E-SECURE MO E-DISKARTE MO

R&D Expenditures as a Percentage of GDP				
Japan (2001)	3.09			
South Korea (1996)	2.82			
USA (2002)	2.82			
Australia (2000)	1.53			
Singapore (1995)	1.13			
New Zealand (1999)	1.03			
Hong Kong (1996)	0.61			
Malaysia (1996)	0.24			
Philippines (2002)	0.14			
Thailand (1996)	0.13			
Indonesia (1994)	0.07			







Way Forward

June 26, 2018 Bonifacio Global City Taguig City





Increase R & D
Funding

Collaborative Undertaking

ALTERNATIVE FUELS AND ENERGY TECHNOLOGY DIVISION

FORMULATES POLICIES, PLANS AND PROGRAMS RELATED TO NEW AND ADVANCED ENERGY TECHNOLOGIES (NAETs) AND ALTERNATIVE FUELS DEVELOPMENT TOWARDS A SOCIALLY AND ENVIRONMENTALLY RESPONSIVE AND EFFECTIVE UTILIZATION OF ENERGY RESOURCES

In-house Technology R & D and Policy Development

1st Philippines Energy Sector Innovation Challenge

Issuance of Supportingguidelines to Promote AFETs

Legislative Advocacy to Provide Incentives for AFETs

INCREASE FUNDING THROUGH GAA

SOLICITS GRANTS/ODA

Joint R & D
Technology Validation/
Demonstration

STATE UNIVERSITIES AND COLLEGES

MOA with DOST on the Conduct of Energy Related Science and Technology Research and Development R & D

Individual Technology & Innovation Proponent

Private Sector Technology & Innovation Proponent



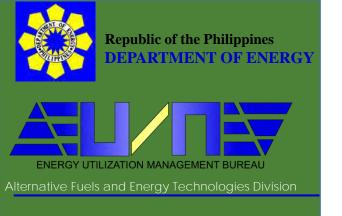


The way to innovative thinking

June 26, 2018 Bonifacio Global City Taguig City



"Challenging the status quo based on a scientific way of thinking and with practicality in mind is the mother of all inventions and innovations" **-**FGDomingoJr





THANK YOU FOR YOUR ATTENTION

