ITRI

Innovating for a Sustainable Future

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Industrial Technology Research Institute (ITRI)

- **Applying for close to 2,000 patents annually**
- **Transferring more than 600 technologies to industry annually**
- **Started up more than 70 new companies**
- **Technological home-base of Taiwan's high-tech industries**
- **New initiative to allocate nearly half of its R&D funding on green energy technologies**

Climate Actions: the Four Key Elements

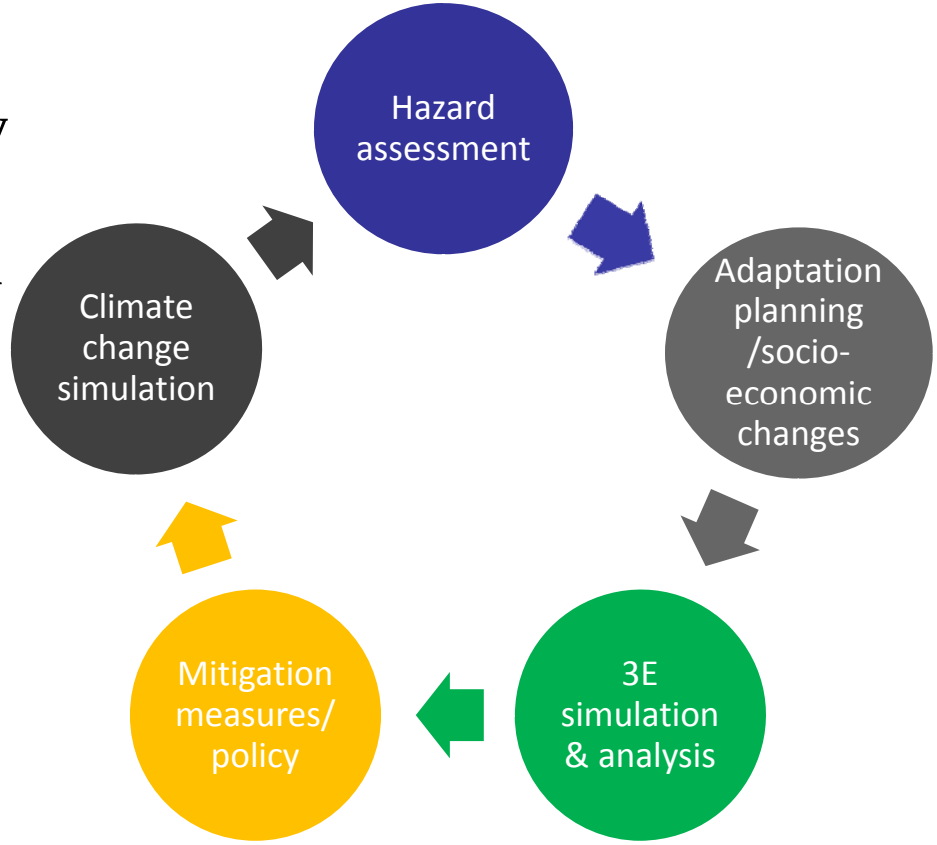
- **Aggressive GHG reduction targets**
  - **Without aggressive targets there will be no demand and market for green energy**
  - **It's the starting point … and UNFCCC has a lot to do**
- **Plenty of green business opportunities**
  - **Governments convert GHG reduction target to ready business opportunities (through sticks and carrots and government packaged projects)**
  - **Boosting investment and employment through the growth of green businesses**
- **Substantial technological advances (and cost reduction)**
  - **With enough business opportunities and competition, technology may very well surprise everybody …**
  - **Without the aggressive targets and the market and fierce competition they create, however, technology will most likely come up substantially short (just pumping a lot of R&D money is not likely to do it).**
- **Readied adaptation systems**
  - **Mitigation alone … is not likely to get there**

ITRI Mitigation Technology R&D
(Sample Programs and Targets)

- **Grid-level energy storage**
  - **$ 0.02 per kWh (US ARPA-E 2020 target)**
- **Carbon capture and storage (CCS)**
  - **Reduce capture cost more than 50% from the state of the art through advanced reagent and process designs**
- **Advanced cooling (air conditioning)**
  - **30% efficiency improvement through optimized cooling/dehumidification and advanced, frictionless designs**
- **Biofuels**
  - **Bio-butanol: proprietary bio-pathway design that improve carbon utilization rate by one third**
- **BIPV (Building-integrated photovoltaics)**
  - **Matching PV efficiency with nano-structured light-guides (2012 WSJ R&D 100)**
- **Lighting**
  - **Significant cost reduction through OLED-based light engine development**

ITRI Approach toward Adaptation Technology Development

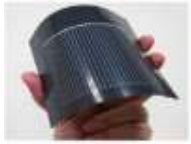
- **Strategic Planning**
  - **Indentifying nation's fragility**
  - **Cost-benefit analysis of adaptation measures through ITRI A.M.I.S.**
- **Implementation**
  - **Anticipate extreme weather and climate events**
  - **Leverage ITRI core technologies**
  - **Collaborate with Taiwan's active International aid organizations**



Concepts of **A.M.I.S.**

AMIS: Framework for Assessment of Adaptation and Mitigation Integrated System

Sample Applications




Solar power generation

Portable wind power generator

Energy

Green Campus

Green Technology

Emergency water purification system

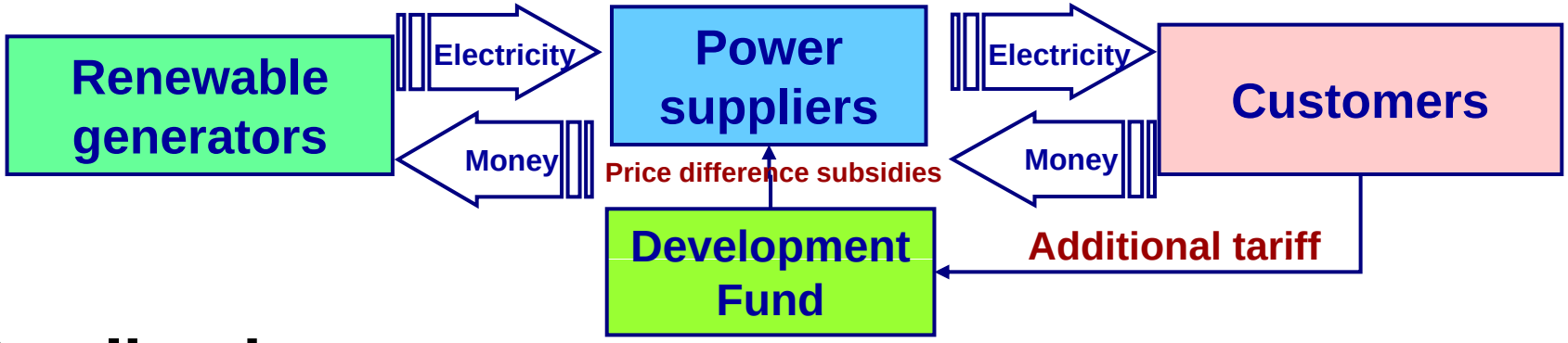
EH&S

Resource

Portable Eco-Toilet

LED Lighting

Emergency Power
with Affordable Solar Arrays



Applications

Lighting and cell phone charging

3.2 kWp solar array

Only light during power outage in WuTai Town

Emergency Power

with Flexible Solar Batteries

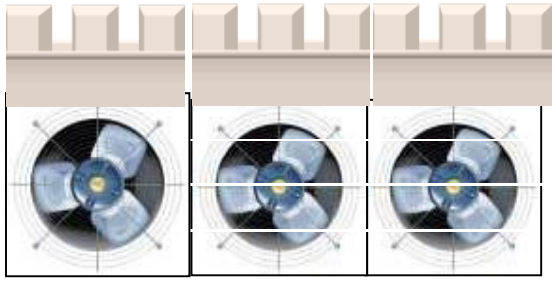
- Design concepts
  - Portable solar power
  - Reduce weight through flexible CIGS modules
  - Can be integrated into various applications (e.g., bags, tents, backpacks)
- Product characteristics
  - Lightweight
  - Flexible, easily affixed to various surfaces
  - Mobile, customizable size
  - Affordable

Flexible CIGS product applications

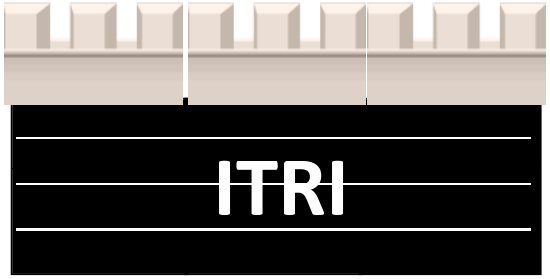
(Pictures reedited from Global solar)

Portable Micro Wind-Power Generators

Traditional wind turbine

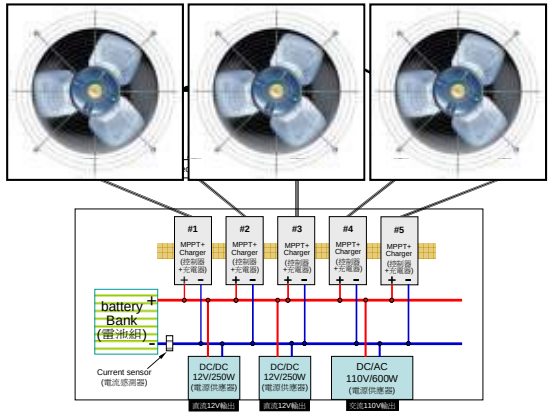


On- baffle open



Off- baffle closed as billboards

Innovative design



-Modularized units facilitating installation and management

-Easily connecting with battery systems

-Terminal controls

- Design concepts
  - Alternative electricity-supply from wind-power
  - Mounted onto buildings; integrating into the landscape or architecture
  - Portable and easy-to-assemble power-supply
  - 400 W generators with DC/AC outputs can be applied as emergency generation

Dry-type Portable Eco-Toilet

- Water & electricity free
- Suitable for remote or devastated area
- Treated with mixture of sawdust and bio-agents
- Odor reduction by natural-ventilation design
- Converting waste into organic fertilizer


玉山 孟祿亭


玉山白木林


八通關 觀高


雪山 369山莊


Internal facilities


fertilizer residue after digestion

Disaster Response System

INTERGRATION

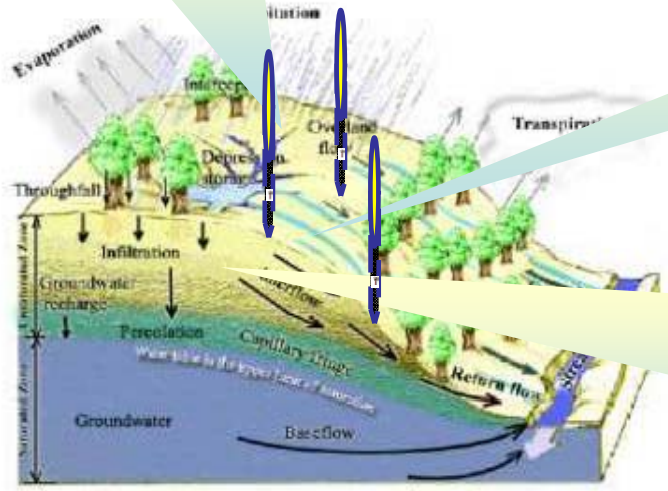
- Manpower management (People)
- Resources and materiel information (Materiel)
- Real-time information of hazards (Timing)
- Locating the disaster (Areas)

Integrating Tzu Chi's DRM, ITRI's Sahana, OpenGeoSMS, and Ushahidi

Land/Mudslide Early Warning System

In Hazards: Movement detection

- Photo-sensors assist positioning slides through image recognition
- Detection of displacement (accuracy ±1 cm)



Before Hazards: Infiltration detection & collapse analysis

Soil infiltration rate detection technology

- Infiltration of rain water to soil leads to slope failure
- Detect infiltration rate through thermocouple and heating wire installed in sensing column

Slope-collapse analysis

- Compile in-situ observations of rainfall and infiltration with groundwater forecast data
- Apply rainfall/ slope-stability analysis for landslide risk assessment
- Provide automatic, instant and accurate early warning information by system integration

Thank You