



## **RETI: A New Concept for Developing the Green Energy Smart Farm<sup>1</sup>**

Keng-Tung Wu<sup>a,\*</sup>, Wan-Yu Liu<sup>a</sup>, and Yi-Yuan Su<sup>b</sup>

<sup>a</sup>Department of Forestry, National Chung Hsing University, Taichung, Taiwan

<sup>b</sup>Department of Law, National Chung Hsing University, Taichung, Taiwan

\* Corresponding author. E-mail address: wukt@nchu.edu.tw (K.-T. Wu).

In 2011, the United Nations proposed “Sustainable Energy for All” (SE4All) initiative, i.e., ensuring universal access to modern energy services, doubling the global rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix by 2030. Afterwards, in 2015, 17 Sustainable Development Goals (SDGs) were agreed by the world’s leaders including securing access to affordable, reliable, sustainable and modern energy for all by 2030 (SDG 7).

Currently in the developing countries, most farms are settled in the remote rural areas. It is difficult for these farm families to employ the modern and clean energy through the centralized power grid. Therefore, burning traditional biomass fuels is the only way for the farm families to conduct their cooking, heating, and other activities, if they would like to use the energy. Consequently, breathing in toxic smoke would occur with burning traditional biomass fuels. Thus, the modern and clean energy should be introduced to assist these farm families in improving the living conditions.

Therefore, we introduce the RETI (regulations, economy, technologies, and integration), a new concept for developing the green energy smart farm in the developing countries. Because to develop the green energy smart farm, the challenges and barriers include type and definition of renewable energy, constructing a small-scale standalone distributed renewable energy system, financial mechanism, legislative and policy framework, incentives of renewable energy, etc. No single issue can be sorted out alone, so “Integration” becomes an important task. Some concerns are summarized as follows.

Renewable energy offers additional benefits over fossil fuels besides reducing pollution and carbon emissions. These decentralized power sources could potentially increase electrification rates cheaply in rural areas. The establishment of green energy smart farm could achieve the sustainable and efficient usage on agriculture resources and generate electricity for local needs. It could also provide new technologies and job opportunities and attract new residents. Domestic households would be able to improve their income and living qualities by recycling agriculture waste and reducing the usage of chemical fertilizations. The improvement of local economic could stabilize the society and enhance the protection of the natural environment.

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In order to establish an energy smart farm, users should refer to their own governments whether there are regulations for promotion of renewable energy. Some countries might focus on a limited types of renewable energy while some encourage all different types of new energy development. The authorized renewable resources by law could be a driving force to encourage users to develop more activities.

The cost of investment is determined by two substantial factors: initial cost and maintenance. Theoretically, initial cost is calculated by the following indicators: a) material required; b) installation labor; c) land incentives; d) tax and legalization; e) profit and commission. Whereas the basic factors to determining the maintenance cost is type-dependent.

In the case of solar energy investment, it requires the solar module, inverter, electrical equipment, installation equipment for racking, installation labor, land incentives for lease, and legalization. The calculations of sum financial by per kilowatt peak or hour installed. The price also depends on the requirement of quality and locations , for example, the installation labor in Thailand and Vietnam are different.

The financial method is based on investment inquiries of the investors. Since most government in Southeast Asia region have not provided the subsidy or loan, the most possible way of investment is to invite local or foreign investor. A bank loan is also possible for operating a start-up solar energy system. However, the bank loan could be different calculation due to interest of loan.

The willingness of new investment depends a lot on the policy and the banking system in a region. The basic requirement for applying a loan or an investment proposal is feasibility study, financial assessment and payback period calculation, operation and maintenance, project plan report, and company reliability certification.

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