“Rice straw open burning (RSOB)” is a tool for small farmers in Thailand to dispose of significant amounts of straw wastes. RSOB acts as a sink for straw but emits air pollutants containing Carbon, Nitrogen and Phosphorus which in turn require additional sinks and cause environmental problems as well as losses of resources.

How to divert straw and its products to more appropriate sinks in order to improve resource efficiency?

MFA and Economic Analysis were applied for assessing straw management on a 1 ha farm. Data and statistics describing the farm were collected from national and international organizations, including data by satellite imageries and from personal interviews. Based on stoichiometric equations and mass balances, process equations for Status Quo and for scenarios including additional technologies suited for small farms were developed. The results were used to design an optimized scenario, and impacts on flows to sinks, environment, resource management, and economic profits were compared to Status Quo.

By optimizing straw management, 1000 kg CO₂E/year are reduced, and CO and PMs affecting public health from the burning process are eliminated. Substances previously released to environment are utilized and embedded into products like protein in food and feed products, methane in biogas, as well as straw brick. Economic profits for farmers increase 4.2 times, motivating farmers to change their straw management.

The Optimized Scenario is a combination concept of simple technologies for straw management allowing farmers to utilize straw and its substances for producing food, feed, energy, and construction material as sinks while reducing or eliminating pollutant emissions from RSOB as well as improving resource efficiency. This improved straw management by using appropriate sinks improves human health, increases farm profits, and reduces the need for resources.