

Case on Sustainable Energy Audit

I. Name of the audit project

Audit investigation on bio-energy (gasification of crop stalks) collective supply project

II. Aims of audit

Through audit investigation on the construction process, the raising, managing and using of funds for bio-energy (gasification of crop stalks) collective supply project in A City, and through the analysis of the economic and social benefits of the project, the economy, efficiency and effectiveness of the project will be assessed, the project's roles on energy conservation, pollution reduction and environmental protection will be evaluated, and problems emerged from the construction and operation of the project will be exposed. Auditors will, accordingly, analyze the causes of those problems and put forward corresponding recommendations, and provide the government some fundamental and actual material regarding sustainable energy promotion in rural areas of China.

III. Audit criteria

The following laws and regulations are used as audit criteria of this audit project:

- *Audit Law of the People's Republic of China;*
- *Renewable Energy Law of the People's Republic of China;*
- *Environmental Protection Law of the People's Republic of China;*

- *Atmosphere Pollution Prevention Law of the People's Republic of China;*
- *The State Council's Regulations on Banning Crop Stalks Burning and Promoting Comprehensive Utilization of Crop Stalks;*
- *Thermal Units, Symbols and Their Conversion (GB/T2586-1991), etc.*

IV. Audit Methodology/Approaches

- Document Review
- On-site Observation/ Field Check;
- Inquiry;
- Analytical review, etc.

V. Contents of Audit

1. Financing status: to review the financing status of every collective stalk gasification supply project, and to reveal problems emerged from financing process.
2. Investment and construction status: to check the investment and construction status of the project, including the investment on equipment, construction and installation, the administrative fee during construction, and other expenditures; to verify problems emerged during project implementation process.
3. Production cost and performances analysis: to verify the cost of project, including raw materials (crop stalks) used and related expenditures occurred; to evaluate the benefits of the project, including the volume of methane and

its by products generated by a project, as well as the number of households and population that a project's gas output could supply.

4. Social benefits analysis: to assess the number of households benefited by the project and the volume of crop stalks consumed annually by the project, through a set of scientific statistical criteria to convert methane energy generated into weight of standardized coal conserved; to survey and analyze the price of methane generated by crop stalks, compare it with the price of liquid petrol gas (LPG), and calculate the money saved annually due to the using of methane for cooking in rural areas; to evaluate the roles that the project played after implementation on reducing pollutant (including SO₂, CO₂) emission and solid wastes (oven cinders) generation.

VI. Audit findings

Audit finds that crop stalks gasification and collective supply project improves the living standards and quality of farmers, reduced the rural environmental pollution caused by crop stalks random storage and open field burning. The project produced clean energy through bio-energy conversion, saved limited energy, like coal, and promoted sustainable use of energy, which plays active roles in building a resources-conserving and sustainable society.

In the aspect of economic benefits, the audit investigation found that the first phase of collective gas supply project of A village, A city had a loss of 2868.2 RMB Yuan due to the low gas price and consumption volume. The auditor assessed that it needs at least 105 household users to make both ends of the

gasification project meet. If all 400 household of the village use methane, a 30000 RMB Yuan profit will be made annually.

In the aspect of social benefits, the audit investigation identified that the project can: firstly, conserve energy (the project consumes 300 tons of crop stalks annually, which may conserve about 150 tons of standardized coal.); secondly, reduce daily expenditure for rural households (as measured and calculated, gasified stalk methane only costs a common household of three persons 30 RMB Yuan (4.4 USD) per month, which is 40 RMB Yuan (5.9 USD) lower than that of LPG.); thirdly, protect the environment (after the implementation of the project, emission of pollutants like CO₂ and SO₂ and generation of solid wastes are remarkably reduced, the pollution caused by fossil energy consumption is alleviated and atmosphere quality deterioration caused by crop stalk burning is effectively prevented.).

However, audit investigation identified some problems in the project. Firstly, due to inadequate recognition of crop stalk gasification techniques, farmers showed limited interests in using crop stalk methane. Secondly, the investment for crop stalk gas collective supply stations construction is not sufficient. The subsidies from provincial and municipal government are comparatively low, some counties and towns could not provide counterpart investment due to uptight public finance. Thirdly, the applied techniques on crop stalk gasification need to be further developed and improved.

VII. Audit recommendations

1. The government shall improve its planning on crop stalk gasification and collective supply stations. The construction plan must be considered together with the strategic planning of rural development, so as to enlarge the scale of collective inhabitation and increase the stalk methane supply to an economic operation scale which will reduce the cost of methane production.
2. The government shall invest more public funds in the project to help the construction of gas station and increase subsidy level. Meanwhile, the government shall encourage private sector investment in this area to promote the development of renewable energy in a larger scale.
3. The government shall organize related institutions and entities to carry out collaborated technical research in this area, in order to improve the techniques of gasification and standardization of equipment. Research institutions and equipment manufacturers shall collaborate and improve the technique performance of equipment through technical introduction and self-research and development.
4. The government shall strengthen project's safety management to ensure safe operation of the project. First, safety monitoring and management system for crop stalk gasification and collective supply stations should be established and strictly complied. Routine check-ups should be conducted in gas stations. Secondly, workers' training plan and working certification system should be

established to regulate the operation of gas station to ensure safety production. Thirdly, specifications for gas using should be prepared and introduced to all household, in order to ensure the safe using of gas.

Audit conducted by: Jiangsu Provincial Audit Office

Nanjing Municipal Audit Office

Xuzhou Municipal Audit Office