

ASH AND SLAG HANDLING

3.7. Analytics

3.7.13. Forming of tpps' ash-and-slag management system in Siberia

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ABSTRACT

In this paper the analyses of reprocessing and utilization of ash-and-slag mixtures at the generating enterprises that are the members of "Siberian Energy Association" is presented, the forms of cooperation between the participants in terms of increasing the volumes of TPPs' ash-and-slag wastes utilization and reprocessing in Siberian Federal District are defined.

INTRODUCTION

The major factor that defines the special role of Siberia in the economy of the country is its natural-resources potential. So the issues of effective usage of natural resources that were extracted and the issues of returning the positive balance of the environment are of a great importance in the economy of nature management in the Siberian Federal District (SFD). Taking into account all these factors it's hard to overestimate the importance of planned actions aimed at minimizing the negative impact that economical activity of TPPs have on environment in Siberia.

Mr. A.V. Kvashnin, the authorized representative of the President of the Russian Federation in SFD has numerously pointed out that "Siberia is a "natural storage". But it's impossible to launch scale projects of natural resources mastering without implementation of new technologies. It's not only ineffective but felonious."

During discussions concerning setting wastes reprocessing industry in the Russian Federation in the Security and Defense Committee of the Federal Council in the framework of the National Session held on December, 3 2009 the following was pointed out: "Today's situation with industrial wastes and wastes of consumption management presents the real danger to the national security".

The developing and mastering of ash-and-slag reprocessing and utilization strategy of generating or other enterprises that are members of "Siberian Energy Association" (SEA) presupposes the systematic approach dealing with ash-and-slag issue in conditions of developed market economy. The strategy is aimed at decreasing the volumes of resources that are being used in heat and power production.

There are six ash-and-slag materials producers operating on the territory of SFD, which are the biggest TPPs, members of "Siberian Energy Association":

- OJSC "Regional generation company №11":
 - total number of TPPs burning hard fuel – 4;
 - Kuznetsky and Ekibastuzsky coal;
- OJSC "Novosibirskenergo":
 - total number of TPPs burning hard fuel – 5;
 - Kuznetsky and Kansky coal;
- OJSC "Regional generation company №12":
 - total number of TPPs burning hard fuel – 13;
 - Kuznetsky coal;
- OJCS «Regional generation company №13»:
 - total number of TPPs burning hard fuel – 7;
 - Nozarovo and Borodinsky coal;
- OJSC «Irkutskenergo»:

– total number of TPPs and boiler houses burning hard fuel – 13;

– Azeysky, Mugunsky, Borodinsky, Cheremkhovsky, Pereyaslavsky, Zheronsky coal;

- OJCS «Regional generation company №14»:

– total number of TPPs burning hard fuel – 8;

– Kharanorsky and Gusinozersky coal and coal from minor deposits.

The total number of TPPs within the Association is 46, there are 46 State District Power Stations (SDPS) and big boiler houses burning hard fuel extracted from different deposits.

At structural enterprises of generation companies members of SEA there are:

– accumulated more than 327 million tons of ash-and-slag materials;

– the annual output is about 7 million tons;

– some more than 1 million tons used which is less than 15 %.

Ash-and-slag mixtures in most of the cases are being dumped to ash ponds by hydraulic conveying systems.

The problem of constantly increasing volumes of ash-and-slag mixtures that are having a negative impact on environment demands immediate measures to be taken.

Passing from resource saving model in energy production it becomes hard to define the tasks professionally in order to have a number of organizational arrangements to be held.

Total cost of hydro conveying system and ash ponds construction goes up to 16...17 % of the TPPs' cost, operating cost is about 7...10 % of the total TPPs' expenses which badly affects the prime cost of energy. Ash-and-slag ponds storing ash-and-slag mixtures occupy large territories and demand costly operation.

The importance of the effective usage of economical resources by TPPs' structural subdivisions and enterprises dealing with reprocessing and utilization of TPPs' ash-and-slag mixtures is defined not only by the lowering resources capacity of the production but by the need to raise its competitiveness on the market.

Siberian thermal power plants use coal from various deposits with ash content from 6 up to 43 %, most part of which (up to 42 %) is Kuznetsky coal with ash content about 8...12 %. Up to 38 % is Kansko-Achinsky coal with ash content about 6...11 %, the rest (19...20 %) is coal from minor deposits with ash content about 14...27 %, which includes the coal imported from Kazakhstan, coal of Ekibastuzsky open-pit mines with ash content is up to 43 %.

In order to put ash-and-slag materials into operation we have to start with differential approach as the quality content and the ways of using ash-and-slag materials vary dramatically:

- From the economy point of view according to applying cost;
- In terms of meeting environmental legislation;
- In terms of technical decisions, technological processes and constructive decisions.

The content analyses presented shows that ash-and-slag materials from Siberian TPPs are diverse in terms of chemical content strength and quality features so for putting into operation ash-and-slag materials differential approach is needed.

Depending on content and quality ash-and-slag materials are used:

- as a substitute for natural building materials such as sand, soil, crushed stone;
- as a row material for reinforced concrete production making; for walling materials, heat-insulating, binding and other building materials;
- as a row product for getting valid row materials.

As it was already pointed out the deep reprocessing would have a great importance but today the research hasn't been finished, the technology hasn't been worked out. In order to be ready at industrial scale the pilot-testing and continuous flow process technology have to be done. Only then the resource saving effect will be achieved.

Currently the technology of deep reprocessing (with the elements of nanotechnologies) has been worked out on the basis of Omsk State University. The technology has been worked out on the basis of accumulated experience at the same time testing was fragmentary partly in laboratory conditions.

Applying of deep reprocessing of ash-and-slag materials would be very important for economy development as it has a constantly enlarging resource stock.

Using ash-and-slag materials from TPPs as a row material in building materials production as well as using ash-and-slag as a substitute for natural row materials in industrial and civil building are the major directions, but until now using ash-and-slag materials in construction industry of the regions was spontaneous.

To put into operation ash-and-slag materials at industrial scale systematic approach is needed. The aim of approach is to stop accumulating "ash-and-slag wastes".

The main aim of creating coordinating management body dealing with ash-and-slag materials management is to lower the heat and energy production cost, which in its turn will guarantee lowering of the heat and power tariffs, as well as enlarging of the regional row materials bases by putting into operation ash-and-slag materials from TPPs.

Achieving this aim removes a number of problems and has a multifunctional character:

- searching out the additional sources of funding aimed at economy development of Siberian regions;
- enlargement of row materials base by putting ash-and-slag materials into operation and as a result lowering the deficit of natural materials;
- restoration of positive balance of quality of the environment;
- economy of natural and investment resources.

Each strategic direction needs to be considered in details as the way of achieving the aim.

Organization of ash-and-slag materials management, its reprocessing and utilization sets the following tasks:

- I. Forming of structure organizing recurring resumption of resources its reprocessing and using;
- II. Facilitate the ash-and-slag materials competitiveness on the product market;
- III. Coordinate and facilitate technical preparation of the suppliers and consumers to putting into operation of ash-and-slag materials;

IV. Facilitate national experience and innovations, as well as adaptation of foreign experience of ash-and-slag materials reprocessing and using at the enterprises of SFD.

Ecological and economical reasons define the interest in ash-and-slag reprocessing and usage.

The most important things in achieving the aim are attracting interested sides and searching for the potential economical effect for each of them.

Positive solution of economical factors reveals in economic effect for suppliers and consumers of ash-and-slag materials, it also affects economy on the regional level.

There are three groups of interested sides they represent potential participants to form systematic approach of putting ash-and-slag materials into operation.

Regional managing subjects of the Russian Federation – Governments of Regions of SFD are an integral part among the interested sides, as they are interested in resources saving, lowering the negative impact to the environment, eliminating the deficit of natural building materials in the region.

For suppliers of ash-and-slag materials represented by subdivisions of TPPs members of SEA having effect from:

- lowering the industrial wastes cost;
- raising the revenue from selling ash-and-slag materials.

Forming the structure of selling, reprocessing and using ash-and-slag materials presupposes:

- Organization of interregional centre of ash-and-slag materials reprocessing, using and management with competent professionals;
- Forming of subsidiaries, structural subdivisions and centers of responsibility dealing with ash-and-slag materials management in the generating companies;
- Forming of regional working groups with competent professionals on the regional level.

The assessment of current situation shows that usage of resources potential doesn't meet the challenge of time. New tasks have been stated in the sphere of natural, recurrent resumed resources, investment resources aimed at lowering of the resources capacity of production and negative impact on the environment.

In order to organize the structure of recurrently resumed resources from industrial wastes in regions as well as for consolidation of economical activity in this direction it is offered to create "Interregional management centre of recurrent resuming of resources from TPPs".

"Interregional management centre of recurrent resuming of resources from TPPs" will join representatives of working groups of SFDs' regions and generating companies which are the members of SEA.

The aim of creating of Interregional centre is to organize the management of recurrent resuming of resources from heat and power production wastes.

Achieving of the aim in SFD will facilitate:

- lowering of irrational natural resources extraction;
- restoration of positive balance of the environment for the human being;
- rational using of natural and investment resources;
- eliminating the deficit of natural building materials and raw materials

Main objectives of the centre are:

- (I) Consolidation of the main regional administrative bodies, generating companies (as suppliers), construction agencies (as consumers) aimed at increasing the volumes of recurrently resumed resources;
- (II) Defining the tasks and coordination of work of working group aimed at recurrently resumed resources management;
- (III) Forming public opinion in terms of the benefits of using TPPs' ash-and-slag materials;
- (IV) Studying, analyzing, summarizing and facilitating of foremost national experience as well as foreign experience in terms of using and reprocessing ash-and-slag materials from TPPs;
- (V) Facilitation of legal and normative-technical substantiation of ash-and-slag usage in the regions of SFD.

Working groups would consist of representatives from:

- Governments' Ministries of the regions SFD that are interested in reprocessing and using ash-and-slag materials;
- generating companies functioning (suppliers of ash-and-slag materials) in this region;
- clients dealing with big construction sites;
- engineering and scientific organizations taking part in organization of reprocessing and using ash-and-slag materials;
- customers and processors.

The aim of creating regional working groups is management of recurrently resumed resources from industrial wastes of TPPs in the region.

Achieving this aim in regions will facilitate:

- lowering of irrational natural resources extraction;
- restoration of positive balance of the environment for the human being;
- rational using of natural and investment resources;
- eliminating the deficit of natural building materials and raw materials

Main objectives of the working groups are:

- (I) Consolidation of the generation companies (as suppliers) and construction agencies (as consumers) aimed at increasing the volumes of recurrently resumed resources;
- (II) Coordination of TPPs recurrently resumed resources management, reprocessing and using;
- (III) Forming the public opinion in terms of the benefits of using TPPs' ash-and-slag materials;
- (IV) Studying, analyzing, summarizing and facilitating of foremost national experience as well as foreign experience in terms of using and reprocessing ash-and-slag materials from TPPs;
- (VI) Facilitating legal substantiation of using ash-and-slag materials in the region.

Current structure of SEA generating companies doesn't fully correspond to resources saving tasks in conditions of market relationships.

The aim of this structure is to organize sales of ash-and-slag materials that exceed the volume of annual current output.

Objectives of the presented structure:

- to organize technical readiness of structural enterprises for selection and shipment of ash-and-slag materials in accordance to customers' inquiries;
- to form public opinion in terms of the benefits of using TPPs' ash-and-slag materials;
- to raise the competitiveness of ash-and-slag materials with service actions and legal and normative-technical substantiations;
- work with enterprises - customers;
- to form customers' demand for ash-and-slag materials that exceed the supply of TPPs.

Suggested structure of ash-and-slag materials management should be formed stage by stage with correspondence to raising of volumes ash-and-slag materials to be put into the market. Organizing sales management at different subdivisions of generations varies dramatically.

Big suppliers of ash-and-slag materials in the Siberian Federal District should have specialized detached subdivision for organizing large scale sales of ash-and-slag materials.

CONCLUSION

Systematic approach which is the basis for the algorithm of suggested actions is an integral part of one of the main directions of economy, saving natural resources, rational using of investment assets and restoring the positive balance of environment.

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