# RESOURCE EFFICIENCY ENHANCEMENT AS A COMMON BACKGROUND FOR GREEN TAXONOMIES OF BRICS COUNTRIES

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## ABSTRACT

This article considers various approaches to developing taxonomies of green projects and focusing on common requirements of countries and regions. The article also analyses the standards of the International Organization for Standardization and evaluates options for applying its key principles, while developing support instruments to catalyse green projects in resource-rich countries, such as BRICS. The research proposes a scientific rationale for systematising incomplete and controversial approaches to evaluation of green projects in industry. The authors consider the main criteria for the international standard, including (1) reduction of greenhouse gases emissions and increase of their absorption; (2) climate change adaptation; (3) sustainable water management; (4) circular economy development; (5) pollution prevention and control (based on Best Available Techniques); and (6) biodiversity protection and restoration. The authors underline that projects aimed at the enhancement of resource efficiency of production processes play pivotal role for the sustainable development of the industry.

This article analyses current approaches to developing and implementing green projects using the cement sector as an example. This article identifies that in resource-rich countries, the primary focus is on resource efficiency enhancement and implementation of the Best Available Techniques, which allows preventing pollution, reducing greenhouse gas emissions, and contributing towards the circular economy formation.

**Keywords:** green growth; green taxonomy; resource efficiency; environmental performance; Best Available Techniques; pollution prevention; BRICS

## INTRODUCTION

Since 2020, countries around the world have witnessed a surge of interest in developing and implementing projects aimed to meet the Sustainable Development Goals. The importance of open sustainable development reports has been increasing, and standards such as the Global Reporting Initiative now have special sections addressing

sustainability issues. Greater attention has been paid to rankings; special agencies, industrial associations and banks are now involved in the development of various ranking systems. Organizations are often ranked based on the level of transparency and how they describe their initiatives according to environmental, social, and corporate governance (ESG) principles [1]. While greater transparency and more detailed sustainability reports can make organization more attractive to the banking community [2], it is not enough for an objective comparative analysis of projects. To determine how much any project improves environmental and resource efficiency of an industry, reduces negative environmental impact, and decreases greenhouse gas emissions, one needs to have explicit and measurable criteria. Estimates and judgments based on a comparison of the degree of business transparency do not allow for making reasonable conclusions about how green the project is. Development of common green project taxonomies and the use of expert evaluation (assessment) of investment decisions could serve as a framework for a justified selection of priority projects [3].

The purpose of this article is to (i) analyse approaches recommended by the International Organization for Standardization for creating green taxonomy and (ii) assess prospects for using these approaches to develop a common model of taxonomy for BRICS countries.

## METHODS

This study is based on ISO 14030-3 standard (Environmental performance evaluation – Green debt instruments – Part 3: Taxonomy) [4] and uses corporate reporting data as well as information on various sustainable development projects (including green projects). Technological indicators defined in the sectoral Best Available Techniques Reference Documents for consumption and emission levels are used as criteria for evaluating resource efficiency and environmental performance of green projects. Analysis and synthesis are used in this study as standard methods for interdisciplinary research, which include studies in the fields of industrial ecology and sustainable development economics.

## RESULTS AND DISCUSSION

ISO 14030-3 is a significant element of the ISO 14030 series defining green bonds, loans and green project performance evaluation. The title of the series (Environmental Performance Evaluation) reflects that these standards were developed to form a reliable system for evaluating projects designated to be green. Despite wide use of the definition "green project", there is no unambiguous definition of this concept. For example, the Russian taxonomy of sustainable development projects provides criteria for classifying projects as green but does not define them. Typically, projects labelled as "green" aim to reduce negative environmental impact (NEI) by cutting greenhouse gas emissions or increasing resource efficiency, developing buildings and infrastructures with high environmental performance and energy efficiency, as well as to conserve and restore ecosystem services [5]. In the context of industrial progress, the challenge is to distinguish projects significantly changing environmental and resource efficiency and those with lesser impact. This again implies the need to use a system of transparent and understandable criteria, including numerical indicators to enable projects comparative

analysis. Use of such system of criteria permits reliable evaluation of how green the project is.

Taxonomy is a classification based on specific criteria. Comparative analysis of green taxonomies developed in various countries and regions allows us to conclude that the most popular criteria can be classified as follows [4, 6]:

1) reduction of greenhouse gas emissions or increase of carbon capture;
2) climate change adaptation;
3) the sustainable use and protection of water resources (including marine);
4) transition to a circular economy;
5) pollution prevention and control;
6) protection and restoration of biodiversity and ecosystems.

ISO 14030-3 defines the criteria in a similar way. The definition of Best Available Techniques (BAT) in the standard is unrelated to environmental permits. According to the standard, BAT refers to commercially available technology that is recognized by the relevant authorities as a tool to reduce negative environmental impacts (NEI), including $CO_2$ emissions [4]. It is also noted that in countries or regions where the BAT concept is codified in regulations, national or regional BAT directories or reference documents shall be used when developing a taxonomy. This approach aligns with the concept used in some BRICS and Eurasian Economic Union countries, according to which BAT is considered as the basis for industrial, environmental, and climate policies [7]. Implementation of BAT and increase in resource efficiency form conditions for reducing NEI and lowering carbon intensity of industrial processes and products. BAT Reference Documents published in various countries define pollution and resource efficiency levels (BAT-Associated Environmental Performance Levels, BAT-AEPLs). Some BREFs set greenhouse gas emissions indicators. Therefore, it is advisable to consider compliance with BAT for meeting more ambitious goals as the primary selection criterion when improving taxonomies of green industrial development projects (see Figure 1).

A feature of the taxonomy described in ISO 14030-3 is the requirement to demonstrate that when a positive effect is achieved in one criterion there shall be no negative effects to the remaining five [4]. And, priority shall be given to projects that achieve a synergy effect, i.e., performance improvement in several criteria. This requirement is shown on Figure 1.

According to ISO 14030-3, projects that aim to improve resource efficiency, including energy efficiency of industrial production are classified as green projects. The standard underlines that potential benefits include the reduction of greenhouse gas emissions and introduction of Best Available Techniques (both BAT as techniques and the equipment used to reduce specific energy consumption). The document also provides examples of green project target areas for resource-intensive sectors such as non-ferrous metallurgy, chemical industry and cement production. The main part of the document describes indicators, reflecting the increase in resource efficiency and their description but not numerical values, which signals that the international expert community is taking a principled stand on the issue.

There are two options for setting project evaluation criteria in the taxonomies of sustainable development projects. These are references to the relevant BREFs and specific indicators of energy efficiency and/or greenhouse gas emissions in $CO_2$-e per

unit of production. BREFs are continuously updated, and numerical indicators reflecting environmental efficiency, resource efficiency and carbon intensity are adjusted. This allows BRICS countries, in which the BAT concept is not fully utilized, to choose which reference documents to use and which indicators to prioritize for the green development.

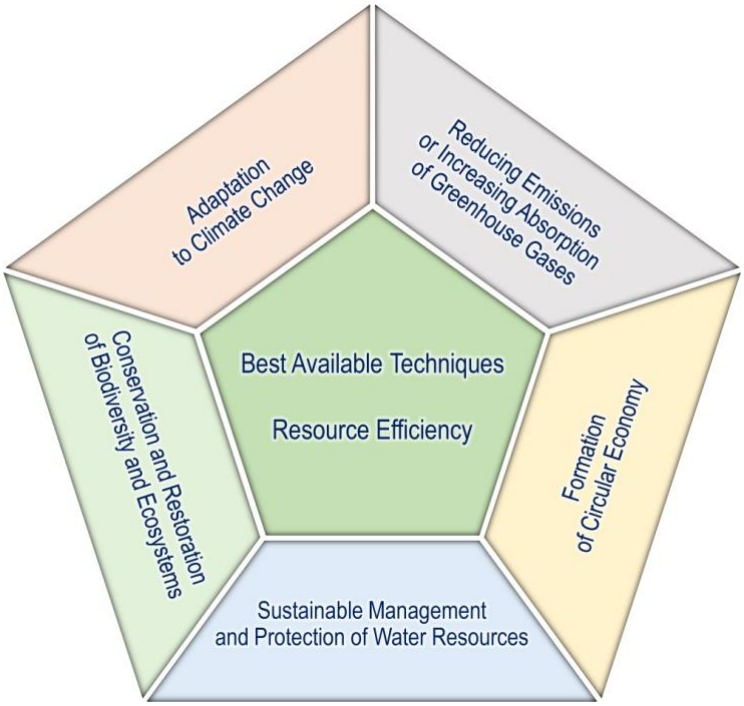


**Figure 1.** Best Available Techniques as the core of a green taxonomy

Let us consider a green project developed by the Akkermann Cement company using the recommendations given in ISO 14030-3 and supported by D. Skobelev and A. Volosatova in their study conducted in 2021 [8].

Table 1 shows that the Akkermann Cement project meets criteria established for the project evaluation in both ISO 14030-3 [4] and in published scientific papers [8, 9], which are partly reflected in the Russian taxonomy of sustainable development projects, including green projects.

The complex criterion **K** is used to ensure that the project meets (1) applicable BAT-Associated Emission Levels ($\mathbf{K_1}$), (2) applicable BAT-Associated Resource Efficiency Levels ($\mathbf{K_2}$), and (3) brings additional environmentally sound benefits ($\mathbf{K_3}$):

$$\mathbf{K} = \mathbf{K_1} \wedge \mathbf{K_2} \wedge \mathbf{K_3}$$

Compliance with $\mathbf{K_1}$ means that the Akkermann Cement company operates in accordance with the Integrated Environmental Permit and levels of emissions of key pollutants do no exceed officially set BAT-Associated Emission Levels established [10].

Compliance with $\mathbf{K_2}$ is guaranteed by high resource (including energy) efficiency and use of metallurgical slag as a component of a raw materials mixture (partially replacing natural limestone).

$\mathbf{K_3}$ is related to the unique aspect of the green project in question - its ability to achieve a number of positive effects (reduction in greenhouse gas emissions compared to a typical plant of similar capacity; decrease in the area of metallurgical slag dumps; better slag dust

control in conditions of continental almost arid climate) through high resource and energy efficiency and use of secondary resources (metallurgical slag) according to the circular economy principles. Further cuts in greenhouse gas emissions are possible through the use of alternative fuels (used car tires, dehydrated sewage sludge and refuse-derived fuel (RDF)) [10]. However, the requirements for fuel quality control (within the framework of the quality management system) and industrial environmental control shall be strengthened as usage of alternative fuels may increase certain pollutants in stack gases.

**Table 1.** The Akkermann Cement project's compliance with ISO 14030-3 recommendations [4] and complex criterion for the pre-investment analysis of green projects [8]: an expert assessment

| ISO 14030-3 criteria [4] | Complex criterion $K = K_1 \wedge K_2 \wedge K_3$ [8] | Akkermann Cement project characteristics | Quantitative indicators, compliance with BAT according to BREF 6-2022 [10] |
|---|---|---|---|
| Reduction of greenhouse gas emissions or increase of carbon capture | Established by the $K_3$ sub-criterion: achievement of additional positive effects, including cuts in greenhouse gas emissions | $CO_2$ emissions are reduced by replacing part of the limestone used with metallurgical slags and increasing the energy efficiency of cement clinker production | Specific emissions of 0.53 $CO_2$-e per ton of clinker are significantly lower than the average value for the industry (when using traditional fuel) |
| Climate change adaptation | Not considered for projects related to BAT scopes | A positive effect is possible due to the elimination of metallurgical slag dumps, which solves the problem of slag dust control in a continental climate with a low amount of precipitation | Quantitative indicators (decrease in the atmospheric dust concentration in the zone affected by slag dumps) can be obtained by means of ongoing observations and tests |
| Sustainable use and protection of water resources | Considered in the context of BAT; not considered for clinker production | Project does not affect how water resources are used. However, the company has plans to eventually flood the depleted limestone quarries, which will contribute to forming new ecosystem services | – |

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| ISO 14030-3 criteria [4] | Complex criterion $K = K_1 \wedge K_2 \wedge K_3$ [8] | Akkermann Cement project characteristics | Quantitative indicators, compliance with BAT according to BREF 6-2022 [10] |
|---|---|---|---|
| Transition to a circular economy [11] | Considered in two aspects: as the generation of additional positive effects (**$K_3$**) and as the application of BAT aimed at recycling secondary resources | Using metallurgical slags in cement clinker production is an attempt solution aimed to form a circular economy [3, 5] | Slag content in the feed is 30-35%, which is significantly higher than the resource efficiency indicator provided by ITS 6-2015 |
| Pollution prevention and control (BAT) [9] | Established by sub-criterion $K_2$ in terms of resource efficiency: better indicators must be achieved than those set in the relevant ITS | BAT for clinker production is to increase energy efficiency and replace part of natural raw materials with secondary resources [9, 10] | Specific energy consumption is 3.0 GJ per ton of clinker, which corresponds to the lower limit of industry indicators for dry clinker production in Russia (3.0 to 4.1 GJ/t) |
| Protection and restoration of ecosystems | Considered as generating additional positive effects, including those contributing to solving problems set forth in the National Project "Ecology" (**$K_3$**) | Gradual restoration of the landscape that was disrupted by metallurgical slag storage from 1955 to 2002 | Clinker production uses 6 million tons of slag annually (5 million tons of the slag accumulated in previous years and 1 million tons coming from Ural Steel JSC) |

## CONCLUSION

Our analysis of ISO 14030-3 (Environmental performance evaluation – Green debt instruments – Part 3: Taxonomy) shows that provided practical recommendations can aid in the development of a uniform and coherent basis for development of green taxonomies for various regions and countries. Prioritising projects, for instance for granting preferential loans, depends on objectives of industrial, environmental, and climate policies.

The project evaluation criteria include reduction of greenhouse gas emissions or increase of carbon capture, climate change adaptation, sustainable use and protection of water resources, transition to a circular economy, pollution control and prevention, as well as protection and restoration of biodiversity and ecosystems. For resource-rich BRICS countries, it is preferable to consider increased resource efficiency and BAT adoption as the primary goals. Cement production demonstrates that improved resource efficiency

and substitution of natural resources with alternative sources based on circular economy principles can lead to decrease in greenhouse gas emissions. This results in a synergistic effect, where project indicators improve across several criteria for project selection.

It was concluded that when working on improving taxonomies of sustainable development projects and green projects, it is beneficial to avoid usage of numerical indicators reflecting product carbon intensity, energy efficiency, etc., and instead focus on BAT references for sustainable use and pre-investment analysis of green projects within expert assessments.

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