

### STAP guidelines for screening GEF projects

Part I: Project Information	Response
<b>GEF ID</b>	10722
<b>Project Title</b>	Facilitating Cleaner and Energy Efficient Phosphate Chemicals Industry in China (PhosChemEE) Project
<b>Date of Screening</b>	November 23, 2020
<b>STAP member screener</b>	Saleem H. Ali
<b>STAP secretariat screener</b>	Sunday Leonard
<b>STAP Rating</b>	Minor issues to be considered during project design
<b>STAP Overall Assessment of the project proposal</b>	<p>This project targets a complex and vital industrial sector in China – phosphate chemicals – for cleaner production and energy efficiency improvements. An innovative feature of this project is the "mines to market" approach whereby the three components of the project are considering primary extraction of phosphate rock as well as chemical production and waste mitigation. The project also clearly states the circular economy paradigm as an added objective.</p> <p>The climate and environmental impacts of phosphate mining, including in China, are well documented.<sup>1</sup> Hence, actions to introduce green and clean production and circular economy in the sector are urgently needed, especially because the world will continue to depend on phosphate products in different economic sectors. We encourage the project proponent to review the Withers et al. (2015) and Meshalkin et al. 2019 articles.<sup>2</sup> They present options for greening both the primary and secondary phosphate production. The recent STAP report on technology critical elements also contains information on making the mining sector more environmentally friendly, which can be useful to this project.<sup>3</sup> The possibility of recovering other valuable materials, including rare earth elements, uranium, and thorium, during phosphate mining has also been discussed<sup>4</sup> and should be explored in this project if possible.</p> <p>An analysis of barriers to green mining promotion in China<sup>5</sup> indicates that diverse factors influence companies and government willingness to carry out technological innovations, including the scale of</p>

<sup>1</sup> e.g., Reta et al., 2018. Environmental impact of phosphate mining and beneficiation: review. <http://medcraveonline.com/IJH/IJH-02-00106.pdf>; Yang et al., 2014. Environmental impacts caused by phosphate mining and ecological restoration: a case history in Kunming, China. <https://link.springer.com/article/10.1007/s11069-014-1212-6>.

<sup>2</sup> Greening the global phosphorus cycle: <https://pubs.rsc.org/en/content/articlelanding/2015/gc/c4gc02445a#ldivAbstract>; Meshalkin, V., Bobkov, V., Dli, M., & Dovi, V. (2019). Optimization of Energy and Resource Efficiency in a Multistage Drying Process of Phosphate Pellets. *Energies*, 12(17), 3376. <https://doi.org/10.3390/en12173376>

<sup>3</sup> Ali, S. and Katima, J. 2020. Technology Critical Elements and their Relevance to the Global Environment Facility. A STAP Background Document. Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC.

<sup>4</sup> Zhang, 2014. <https://www.sciencedirect.com/science/article/pii/S1877705814011035>

<sup>5</sup> Zhao et al., 2020: <https://www.mdpi.com/2071-1050/12/7/2991/pdf>

mines, supervision cost, and yield and comprehensive utilization rate of tailings and waste rocks. The small-scale nature of most phosphate mining activities in China has been linked to inefficiencies.<sup>6</sup> Hence, this project should consider these barriers and come up with solutions to mitigating them.

A theory of change (ToC) narrative and diagram was presented. The ToC, however, lacks relevant components of an adequate ToC. The ToC that was presented is a diagrammatic expression of the project outputs, outcome, and impacts. The underlying assumptions, pathways, alternative plans, and medium- and long-term impacts required for a complete ToC were missing. We refer the project proponent to STAP's theory of change (<https://stapgef.org/theory-change-primer>) for more information on developing ToCs.

Although this project is targeted at climate change mitigation, the issues considered in the project are interlinked with several environmental and socioeconomic concerns, including land degradation, water pollution, waste and wastewater management, biodiversity and forest loss, food security, job creation, environmental and occupational safety, etc. This was rightly recognized in the PIF. The project will, therefore, generate several co-benefits if well designed and implemented. Therefore, we encourage the project proponent to adopt the systems thinking approach for project development. The systems thinking approach allows project designers to analyze the interlinkages between the various elements of a system in which a problem is embedded, see the whole picture, and design solutions that consider the interlinkages and ensure that synergies are maximized and tradeoffs minimized. Examples of STAP's reports that can help in this regard include:

- Integration: to solve complex environmental problems: <https://stapgef.org/integration-solve-complex-environmental-problems>
- STAP, 2020. Delivering Multiple Benefits through the Sound Management of Chemicals and Waste. Background report (<https://stapgef.org/publications>)
- Achieving enduring outcomes from GEF investment: <https://stapgef.org/achieving-enduring-outcomes-gef-investment>
- Multi-stakeholder dialogue: <https://stapgef.org/multi-stakeholder-dialogue>

Concerning the reuse/recycling of phosphogypsum, there have been concerns about its radioactive properties, but the EPA has recently approved its use in road construction in the US (<https://www.epa.gov/newsreleases/epa-approves-use-phosphogypsum-road-construction>). Therefore, the prevailing legislation in China must be considered in determining the best recycling option. Several reuse/recycling options have been considered in the scientific literature, including as soil amendment, landfill cover, road construction, cement and concrete, coastal zone barrier, mine reclamation,

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<sup>6</sup> Chen et al., 2015: The Phosphorus Flow in China: A Revisit from the Perspective of Production.

[http://www.airies.or.jp/attach.php/6a6f75726e616c5f476c6f62616c456e7669726f6e6d656e74616c52657365617263685f4d696c736463354c/save/0/0/19\\_1-4.pdf](http://www.airies.or.jp/attach.php/6a6f75726e616c5f476c6f62616c456e7669726f6e6d656e74616c52657365617263685f4d696c736463354c/save/0/0/19_1-4.pdf).

	<p>geopolymers, and rare earth extraction. All of these should be analyzed to determine the best option under China's national circumstances.</p> <p>The PIF is missing some annexes, including Annex D on how the global environmental benefits were calculated, Annex E on improvement assumptions, Annex F on Covid response, Annex G on Climate Risk Screening, and Annex I on knowledge management.</p> <p>Concerning the estimation of climate mitigation GEBs, it is unclear how the 15% reduction in specific energy consumption in phosrock mining and beneficiation/refining and 5% reduction in process energy consumption were derived. What are the assumptions behind these numbers? Annex D, which provides information on how the estimates were derived, is missing for the PIF.</p> <p>The potential for extreme climate events impacting the project areas was noted in the environmental and social safeguard template and the PIF. The proposal indicates that a project climate risk screening was completed and included as annex G. However, the annex is missing. We recommend that the climate risk screening of the project be provided for review.</p> <p>Overall, a good and ambitious project that will require careful and systems-based design and implementation to deliver multiple global environmental and socioeconomic benefits.</p>	
<b>Part I: Project Information</b> <b>B. Indicative Project Description</b> <b>Summary</b>	<b>What STAP looks for</b>	<b>Response</b>
Project Objective	Is the objective clearly defined, and consistently related to the problem diagnosis?	Yes
Project components	A brief description of the planned activities. Do these support the project's objectives?	A mines to market energy and material efficiency prototyping of the phosphate chemical sector in China. Project objectives nicely stated and targeted.
Outcomes	A description of the expected short-term and medium-term effects of an intervention. Do the planned outcomes encompass important global environmental benefits?	Yes, all provided nicely
	Are the global environmental benefits/adaptation benefits likely to be generated?	Yes

Outputs	A description of the products and services which are expected to result from the project. Is the sum of the outputs likely to contribute to the outcomes?	Yes provided but calculations for Annex D are missing.
<b>Part II: Project justification</b>	A simple narrative explaining the project's logic, i.e. a theory of change.	Yes presented well
<b>1. Project description. Briefly describe:</b> 1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)	Is the problem statement well-defined?	Partially
	Are the barriers and threats well described, and substantiated by data and references?	Decent risk assessment is provided, including COVID's impact on overall mobility and economic development.
	For multiple focal area projects: does the problem statement and analysis identify the drivers of environmental degradation which need to be addressed through multiple focal areas; and is the objective well-defined, and can it only be supported by integrating two, or more focal areas objectives or programs?	Yes, there are connections made between the energy efficiency and climate mitigation as well as overall waste management benefits.
2) the baseline scenario or any associated baseline projects	Is the baseline identified clearly?	Yes - in earlier parts of the PIF with details on metrics.
	Does it provide a feasible basis for quantifying the project's benefits?	Yes
	Is the baseline sufficiently robust to support the incremental (additional cost) reasoning for the project?	Yes
	For multiple focal area projects:	
	are the multiple baseline analyses presented (supported by data and references), and the multiple benefits specified, including the proposed indicators;	Yes they are presented.

	are the lessons learned from similar or related past GEF and non-GEF interventions described; and	Yes - presented
	how did these lessons inform the design of this project?	Well-incorporated in design.
3) the proposed alternative scenario with a brief description of expected outcomes and components of the project	What is the theory of change?	Yes – presented in detail.
	What is the sequence of events (required or expected) that will lead to the desired outcomes?	Adequate theory of change provided
	What is the set of linked activities, outputs, and outcomes to address the project's objectives?	Each outcome in components is adequately linked to outputs though some more specifics on outputs would be welcome.
	Are the mechanisms of change plausible, and is there a well-informed identification of the underlying assumptions?	Yes – with careful monitoring
	Is there a recognition of what adaptations may be required during project implementation to respond to changing conditions in pursuit of the targeted outcomes?	Yes
5) incremental/additional cost reasoning and expected contributions from the baseline, the GEF trust fund, LDCF, SCCF, and co-financing	GEF trust fund: will the proposed incremental activities lead to the delivery of global environmental benefits?	Yes
	LDCF/SCCF: will the proposed incremental activities lead to adaptation which reduces vulnerability, builds adaptive capacity, and increases resilience to climate change?	Yes
6) global environmental benefits (GEF trust fund) and/or adaptation benefits (LDCF/SCCF)	Are the benefits truly global environmental benefits/adaptation benefits, and are they measurable?	Yes

	Is the scale of projected benefits both plausible and compelling in relation to the proposed investment?	Yes
	Are the global environmental benefits/adaptation benefits explicitly defined?	Yes
	Are indicators, or methodologies, provided to demonstrate how the global environmental benefits/adaptation benefits will be measured and monitored during project implementation?	Yes
	What activities will be implemented to increase the project's resilience to climate change?	Yes
7) innovative, sustainability and potential for scaling-up	Is the project innovative, for example, in its design, method of financing, technology, business model, policy, monitoring and evaluation, or learning?	Yes – the circular economy aspect is innovative.
	Is there a clearly-articulated vision of how the innovation will be scaled-up, for example, over time, across geographies, among institutional actors?	Yes –the pilot projects have been designed with evaluating scaling up potential. Furthermore, there are several SMEs in this sector which are noted as partners
	Will incremental adaptation be required, or more fundamental transformational change to achieve long term sustainability?	Yes – this needs to be considered in terms of technology markets evolving rapidly.
<b>1b. Project Map and Coordinates.</b> Please provide geo-referenced information and map where the project interventions will take place.		Yes
<b>2. Stakeholders.</b> Select the stakeholders that have participated in consultations during the project identification phase: Indigenous people and local communities; Civil society organizations; Private sector entities.	Have all the key relevant stakeholders been identified to cover the complexity of the problem, and project implementation barriers?	Yes

<p>If none of the above, please explain why. In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.</p>		
	<p>What are the stakeholders' roles, and how will their combined roles contribute to robust project design, to achieving global environmental outcomes, and to lessons learned and knowledge?</p>	<p>Provided in supplementary material</p>
<p><b>3. Gender Equality and Women's Empowerment.</b> Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis). Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes/no/ tbd. If possible, indicate in which results area(s) the project is expected to contribute to gender equality: access to and control over resources; participation and decision-making; and/or economic benefits or services. Will the project's results framework or logical framework include gender-sensitive indicators? yes/no /tbd</p>	<p>Have gender differentiated risks and opportunities been identified, and were preliminary response measures described that would address these differences?</p>	<p>Yes</p>

	Do gender considerations hinder full participation of an important stakeholder group (or groups)? If so, how will these obstacles be addressed?	Accounted for
<b>5. Risks.</b> Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design	<p>Are the identified risks valid and comprehensive?  Are the risks specifically for things outside the project's control?  Are there social and environmental risks which could affect the project?  For climate risk, and climate resilience measures:</p> <ul style="list-style-type: none"> <li>• How will the project's objectives or outputs be affected by climate risks over the period 2020 to 2050, and have the impact of these risks been addressed adequately?</li> <li>• Has the sensitivity to climate change, and its impacts, been assessed?</li> <li>• Have resilience practices and measures to address projected climate risks and impacts been considered? How will these be dealt with?</li> <li>• What technical and institutional capacity, and information, will be needed to address climate risks and resilience enhancement measures?</li> </ul>	Yes noted
<b>6. Coordination.</b> Outline the coordination with other relevant GEF-financed and other related initiatives	Are the project proponents tapping into relevant knowledge and learning generated by other projects, including GEF projects?	Well-coordinated
	Is there adequate recognition of previous projects and the learning derived from them?	Yes
	Have specific lessons learned from previous projects been cited?	Partially noted in descriptions
	How have these lessons informed the project's formulation?	Described
	Is there an adequate mechanism to feed the lessons learned from earlier projects into this	

	project, and to share lessons learned from it into future projects?	
<b>8. Knowledge management.</b> Outline the "Knowledge Management Approach" for the project, and how it will contribute to the project's overall impact, including plans to learn from relevant projects, initiatives and evaluations.	What overall approach will be taken, and what knowledge management indicators and metrics will be used?	Good coverage in these sections
	What plans are proposed for sharing, disseminating and scaling-up results, lessons and experience?	Standard reporting

## Notes

STAP advisory response	Brief explanation of advisory response and action proposed
1. <b>Concur</b>	STAP acknowledges that on scientific or technical grounds the concept has merit. The proponent is invited to approach STAP for advice at any time during the development of the project brief prior to submission for CEO endorsement.
	* In cases where the STAP acknowledges the project has merit on scientific and technical grounds, the STAP will recognize this in the screen by stating that <b><i>"STAP is satisfied with the scientific and technical quality of the proposal and encourages the proponent to develop it with same rigor. At any time during the development of the project, the proponent is invited to approach STAP to consult on the design."</i></b>
2. <b>Minor issues to be considered during project design</b>	STAP has identified specific scientific /technical suggestions or opportunities that should be discussed with the project proponent as early as possible during development of the project brief. The proponent may wish to:
	(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised;
	(ii) Set a review point at an early stage during project development, and possibly agreeing to terms of reference for an independent expert to be appointed to conduct this review.
	The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.
3. <b>Major issues to be considered during project design</b>	STAP proposes significant improvements or has concerns on the grounds of specified major scientific/technical methodological issues, barriers, or omissions in the project concept. If STAP provides this advisory response, a full explanation would also be provided. The proponent is strongly encouraged to:
	(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised; (ii) Set a review point at an early stage during project development including an independent expert as required. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.