NARMIN II - Algae Technology for Mine Water Treatment

State of the Art

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Background

Background: Mining and Water

- Metals are essential
- Mining generates water challenges
- Pit lakes requiring long-term water treatment
- Nordic challenge
- NARMIN II: Pilots algae-based treatment with native microalgae + bio ash fertilization under real Nordic conditions

State of the Art: Treatment Approaches

Active chemical treatment

Passive systems

Biological treatment

Industrial by-products

Sweden in an international context

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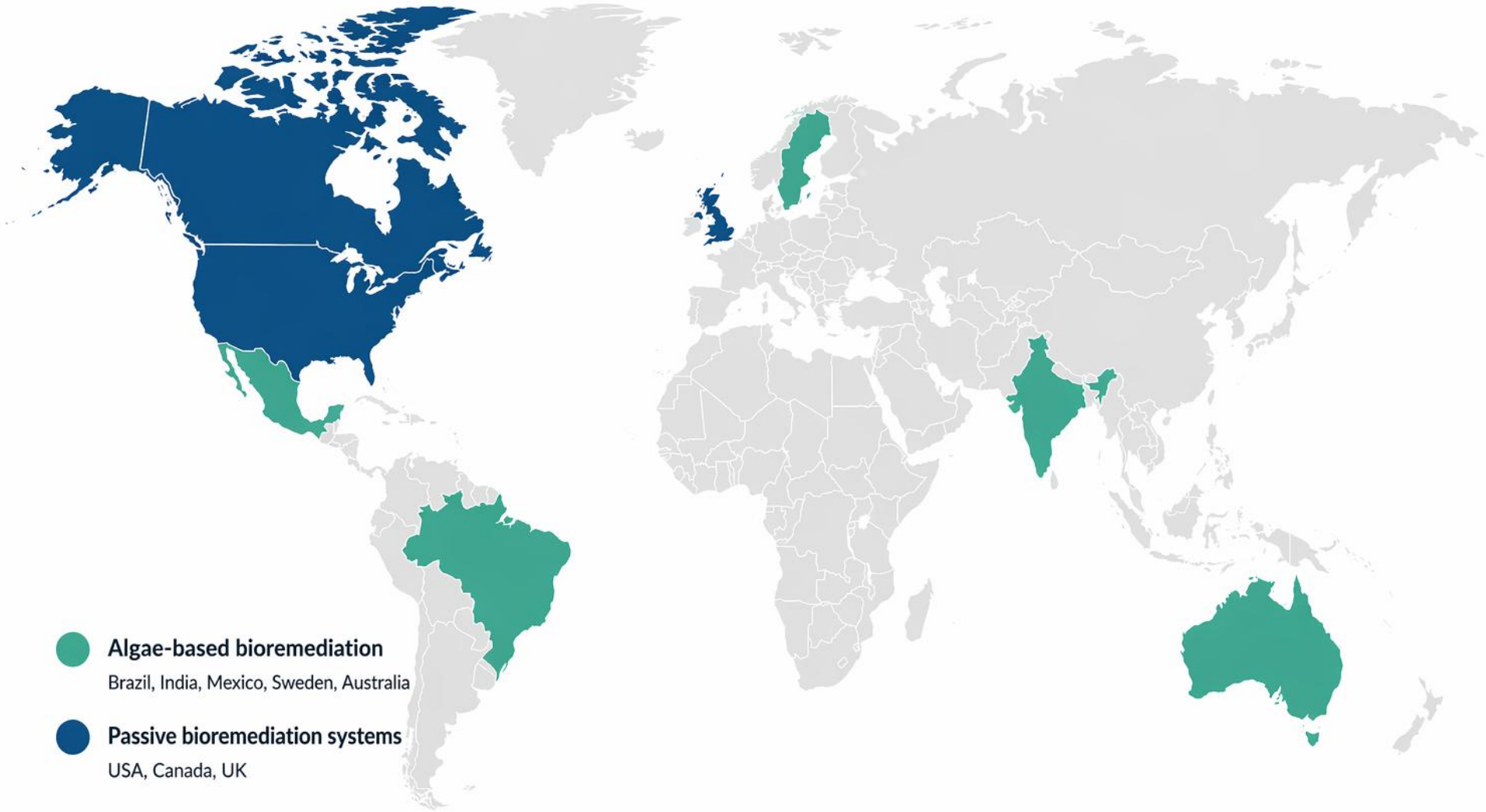
Global Landscape of Bioremediation Approaches

Countries where algae-based and passive bioremediation systems are reported



Note: Map reflects countries specifically mentioned in the state of the art (literature review).

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Bioremediation potential

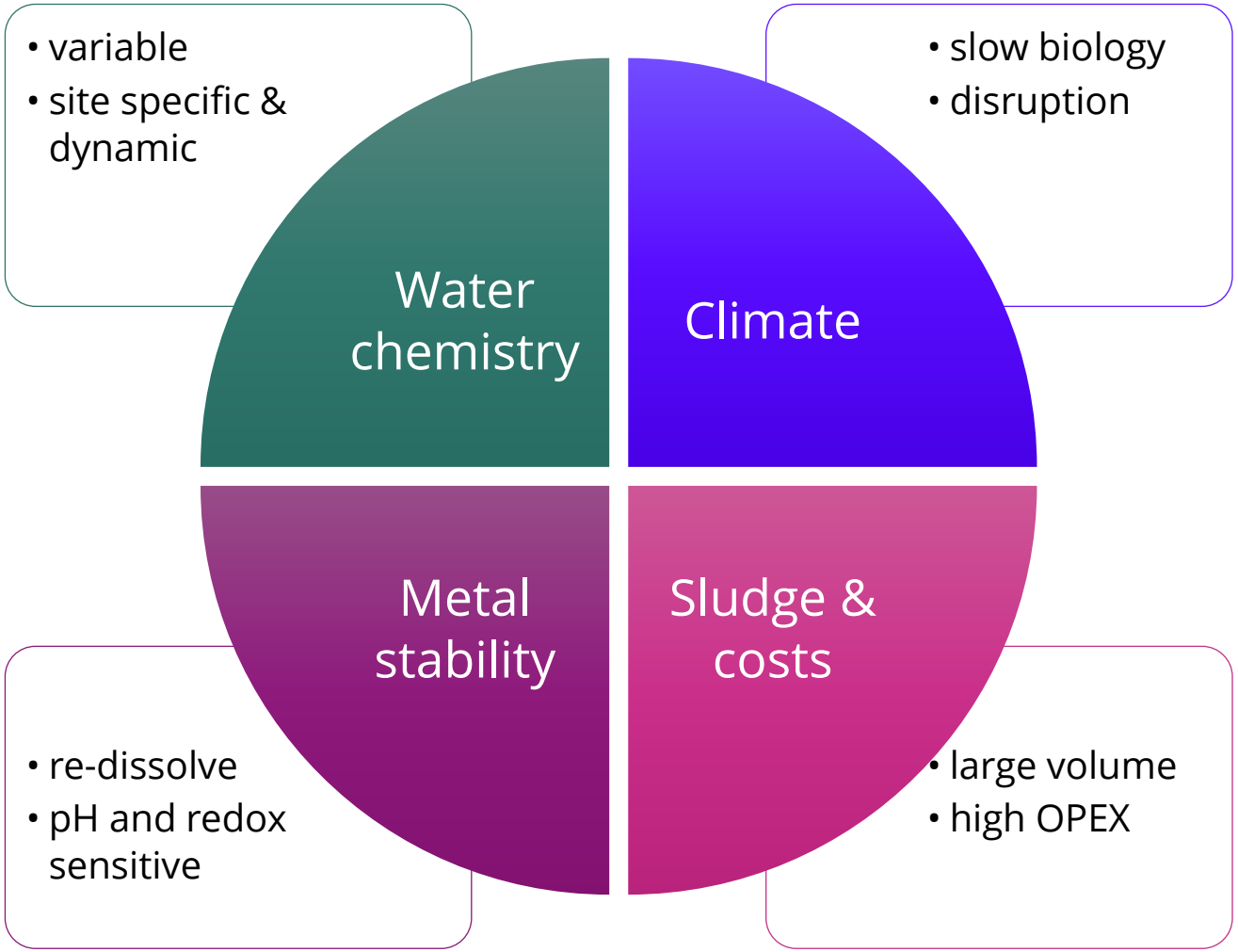
- Metal removal via biosorption and bioaccumulation
- Carbon capture
- Biomass production

- Temperature sensitivity
- Nutrient limitation
- Lack of real-world validation

High potential – but not yet ready for Nordic deployment

Challenges

Key Industrial Challenges



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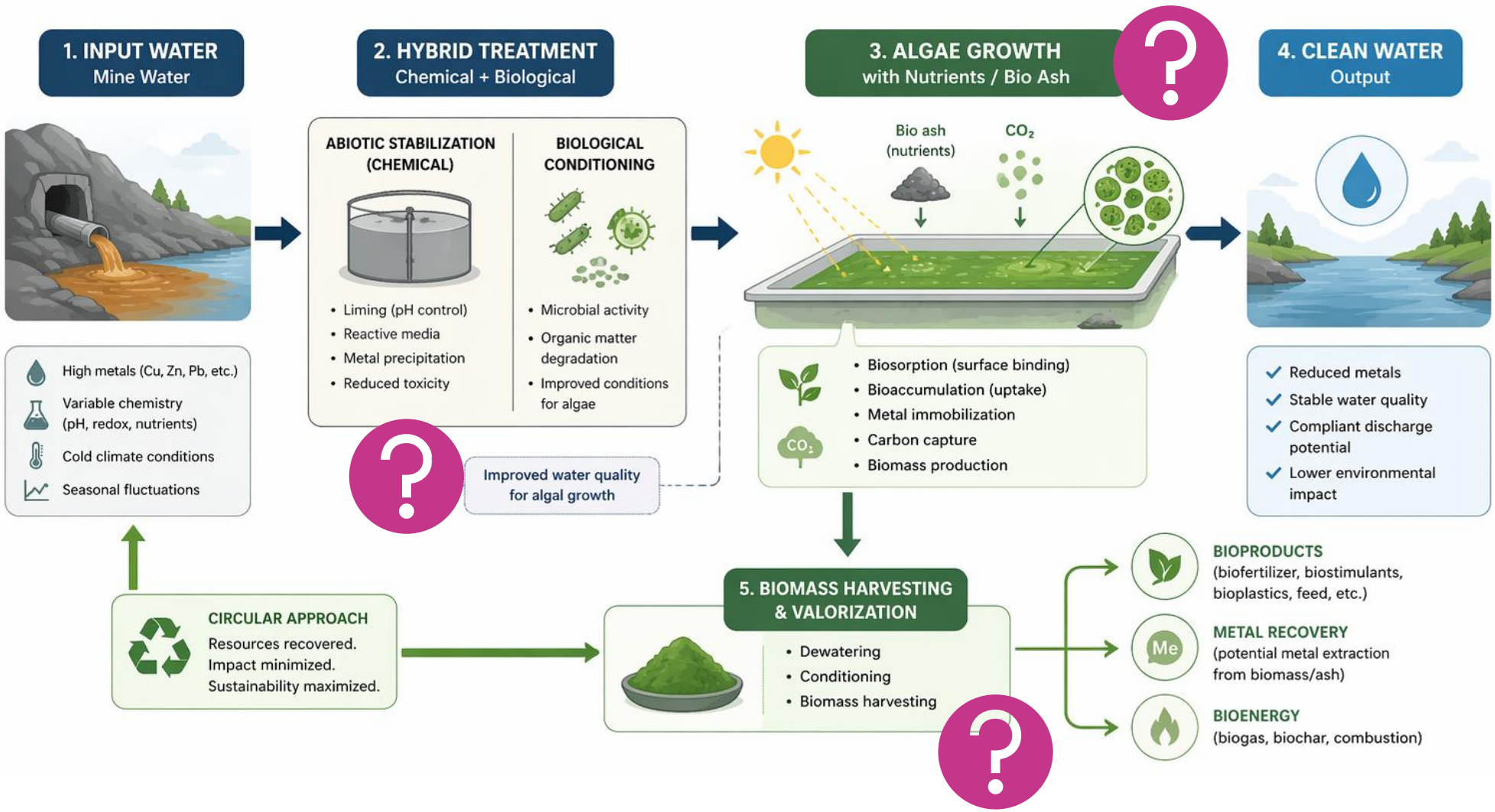
Research frontiers & gaps



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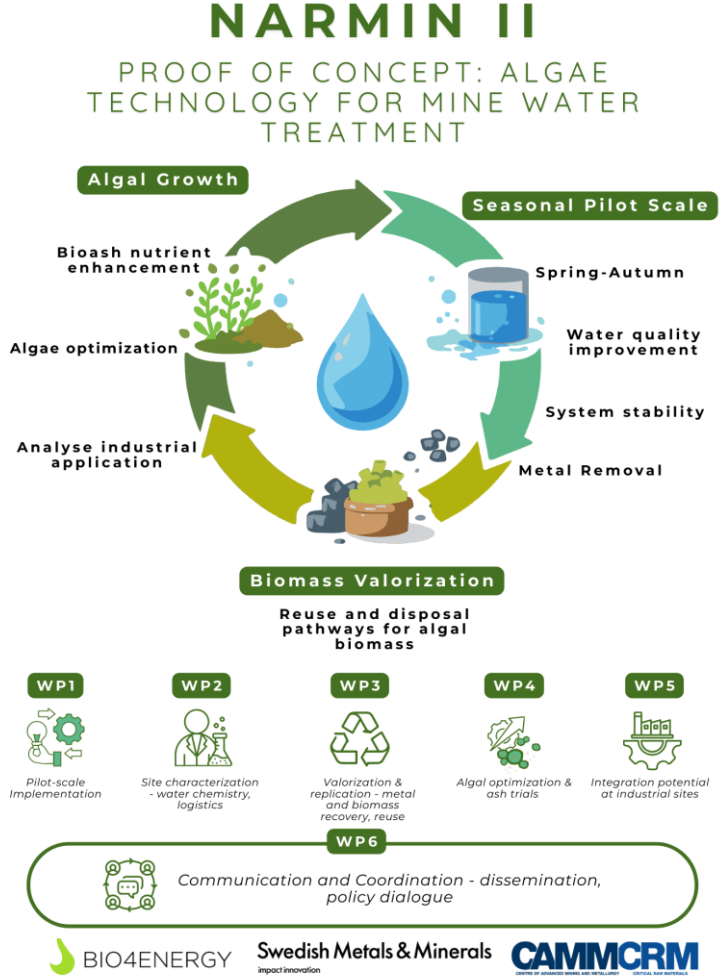
NARMIN II: Addressing the Gaps

- Pilot-scale algae-based treatment under Nordic climate conditions in northern Sweden
- Bio ash as circular nutrient source - overcoming oligotrophic water limitations
- Closed-loop system: water treatment, biomass valorization, and circular resource flows
- Partnership with Talga AB (EU Net-Zero & CRMA site) — links to battery and critical raw material value chains
- Positions Sweden as a global leader in climate-adapted, circular mine water treatment



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Thank You

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BIO4ENERGY CAMMCRM CENTRE OF ADVANCED MINING AND METALLURGY CRITICAL RAW MATERIALS impact innovation

OpenAI (2026). AI-generated images (DALL·E)

Questions?

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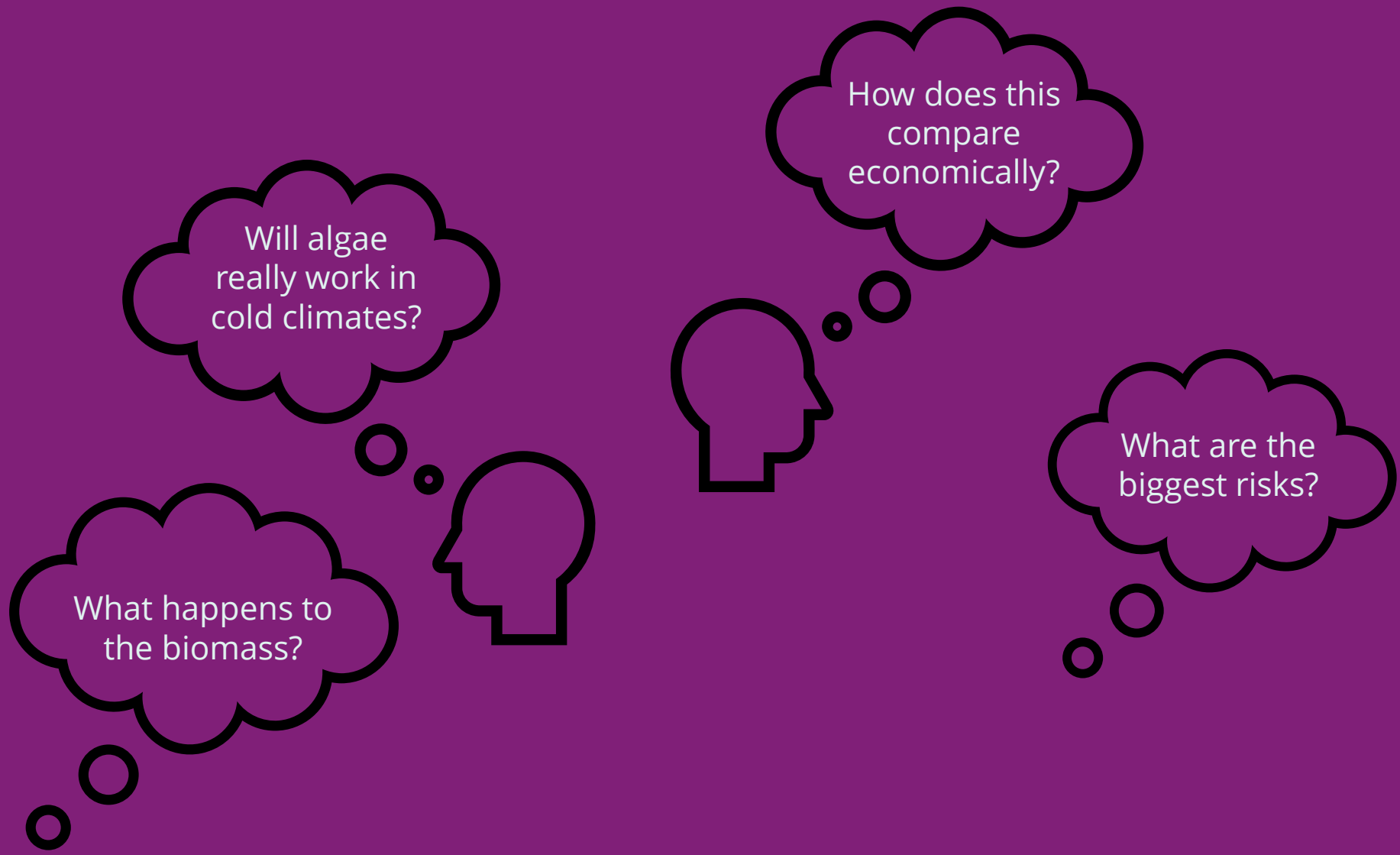

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