

R&D Roadmap-Issues and Problems to be Solved before CCS Deployment



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LEMIGAS

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Structure of Presentation

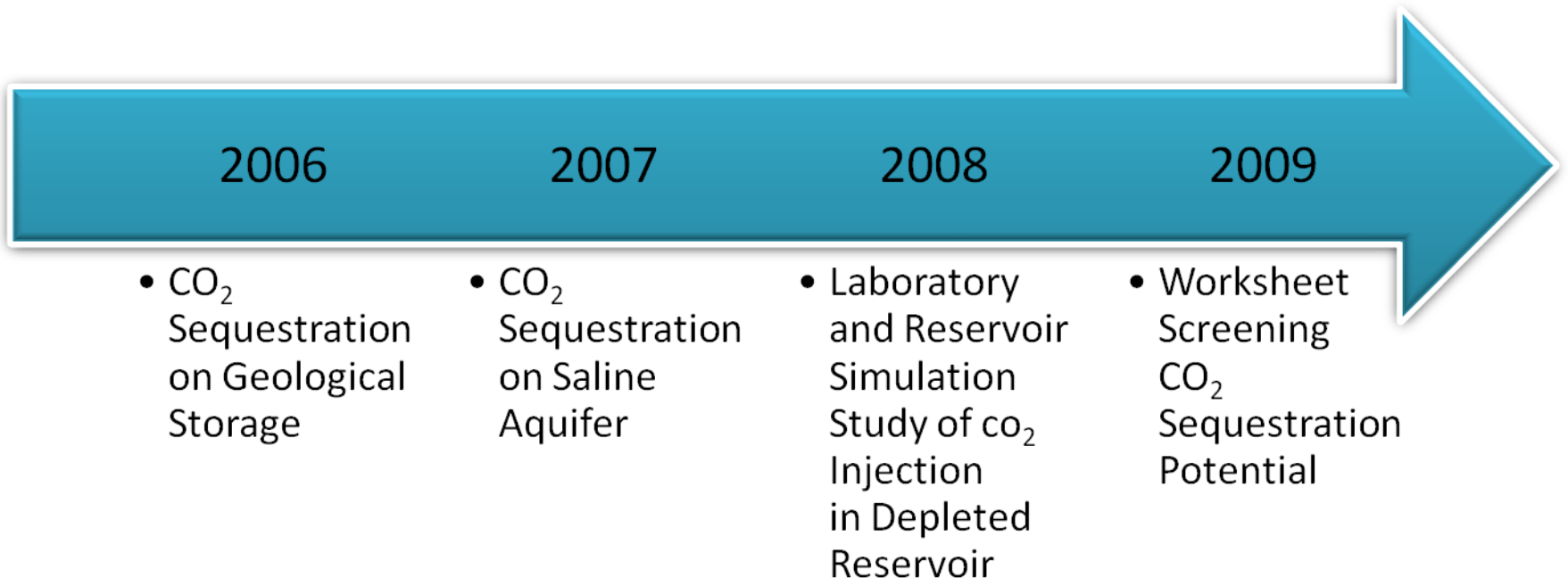
- The Purpose of the R&D Roadmap
- R&D Milestone and Roadmap on CCS
- Main Issues & Challenges-Solutions
- Possible CCS Development in Indonesia
- Key Elements to Prompt Deployment of CCS
- What's Next?

The purpose of the R&D roadmap

- To identify the knowledge gaps
- To address the challenges of technology integration and scale-up
- To set up R&D target achievement
- To provide a vision for addressing the current challenges

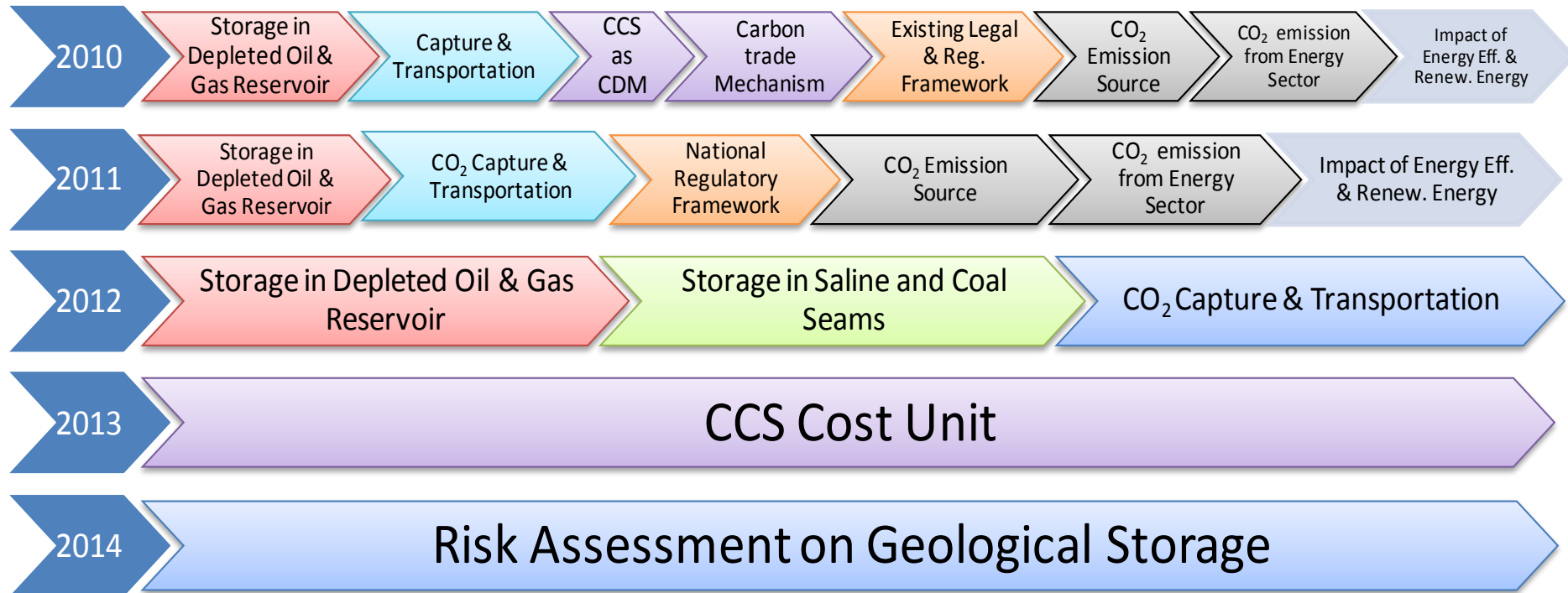
CCS Development in Indonesia

R&D Milestones on CCS



CCS Development in Indonesia

R&D - Roadmap:



Main Issues & Challenges-Solutions

Financing near-term demonstration projects and incentivizing longer-term commercialization

- Engaging energy company to invest in CCS projects
- Collaborating with international organization
- Establish incentives to accelerate commercial-scale CCS deployment

Main Issues & Challenges-Solutions

Establishing effective public regulatory schemes

- Review and adapt existing legal frameworks to regulate CCS demonstration
- Develop comprehensive CCS regulatory frameworks
- Address outstanding international legal issues, such as the development of international protocols for monitoring and verification of CO₂

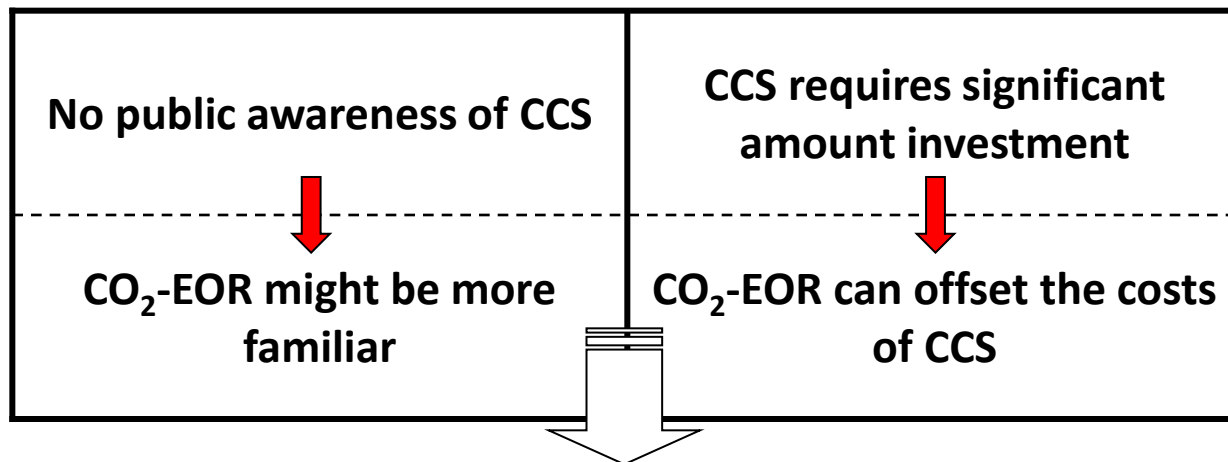
Main Issues & Challenges-Solutions

Engaging and educating the public adequately to incorporate their concerns into project designs

- Expand government activities on CCS public outreach and engagement
- Formalize international public engagement networks and create a public education and engagement toolkit

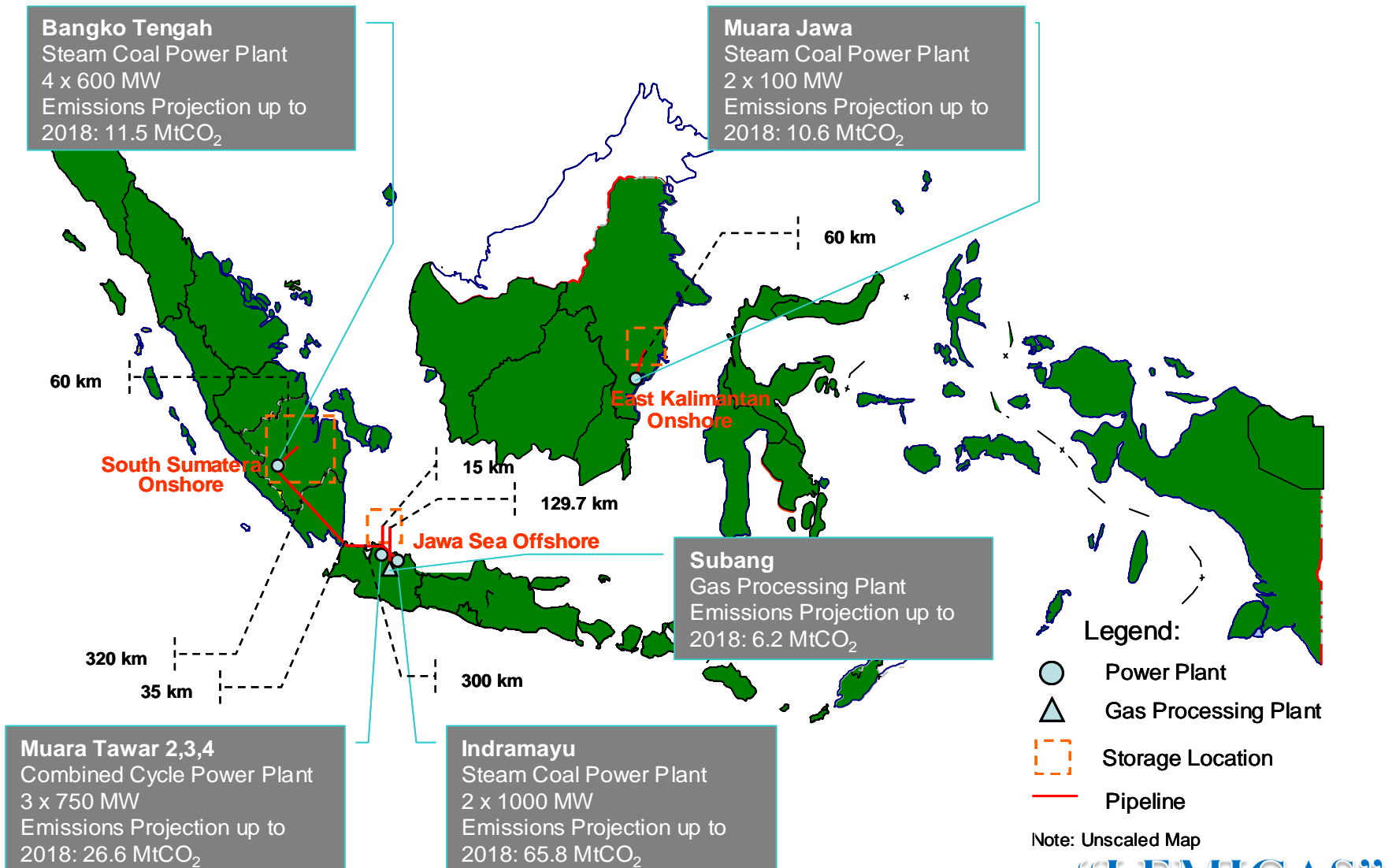
Main Issues and Challenges on CO₂-EOR

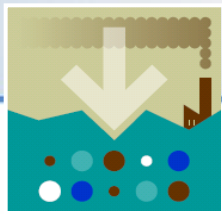
- Energy company is reluctant on investing money on EOR
- High risk-High Cost-Many Uncertainties
- Lack of attractive incentives from the government
- They prefer doing exploration to find new hydrocarbon fields.



CCS-EOR

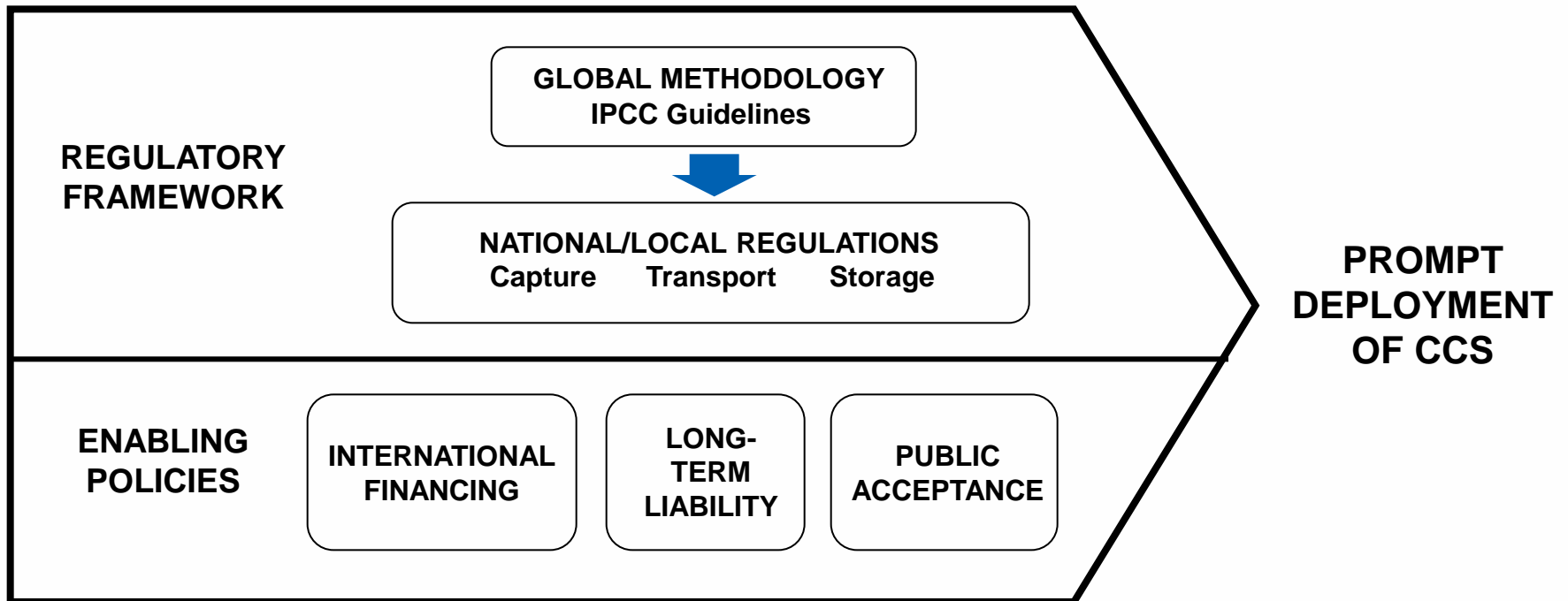
Possible CCS Development in Indonesia





KEY ELEMENTS

CCS REGULATORY FRAMEWORK AND ENABLING POLICIES



What's Next?

- Grow CCS collaborative efforts, particularly related to R&D
- Expand capacity-building efforts in CCS
- Create new CCS collaboration efforts for the most important industrial sectors
- Use international collaboration to speed up the learning process and information sharing that needs to occur
- Demonstration projects are needed in gathering evidence that CCS is safe and effective

Thank You



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Relevant Oil and Gas Regulations with CCS

Regulations

- Government Regulation No.35 year 2004 concerning upstream oil and gas activities
- Law No. 22 year 2001 regarding oil and gas
- Ministerial Decree No. 15 year 2008 concerning hydrocarbon transportation

Characteristics

- Reservoir management, best practice and environmental protection
- General environmental protection
- Standardization and specification of hydrocarbon pipelines

- Mostly only consider common/general environmental impact
- Oil and gas Laws/Regulations can barely be adapted to CCS activities at the moment

Relevant Environmental Regulations with CCS

