Emissions Reduction Warehousing Analysis

Positioning Your Plant for Growth

BURNS McDONNELL

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Agenda

- Perspective: EPC viewpoint on emission reductions
- Motivation: value of internal control evaluations
- Process: steps to evaluate/rank control costs
- Execution: typical control project cycle
- Examples: EPC projects, options, value
- Tips & Takeaways

Perspective: EPC Viewpoint on Emission Reductions

- Emission reduction solutions enable strategic EPC projects: expansions, revamps, grassroots
- ER demands create EPC opportunities
- ER demand is already increasing for HGB serious ozone nonattainment bump - be ready for of the pinch

Bottom line: EPC success in Houston area depends on understanding requirements + delivering internal control solutions

Motivation: Value of Proactive Internal Control Project Evaluations

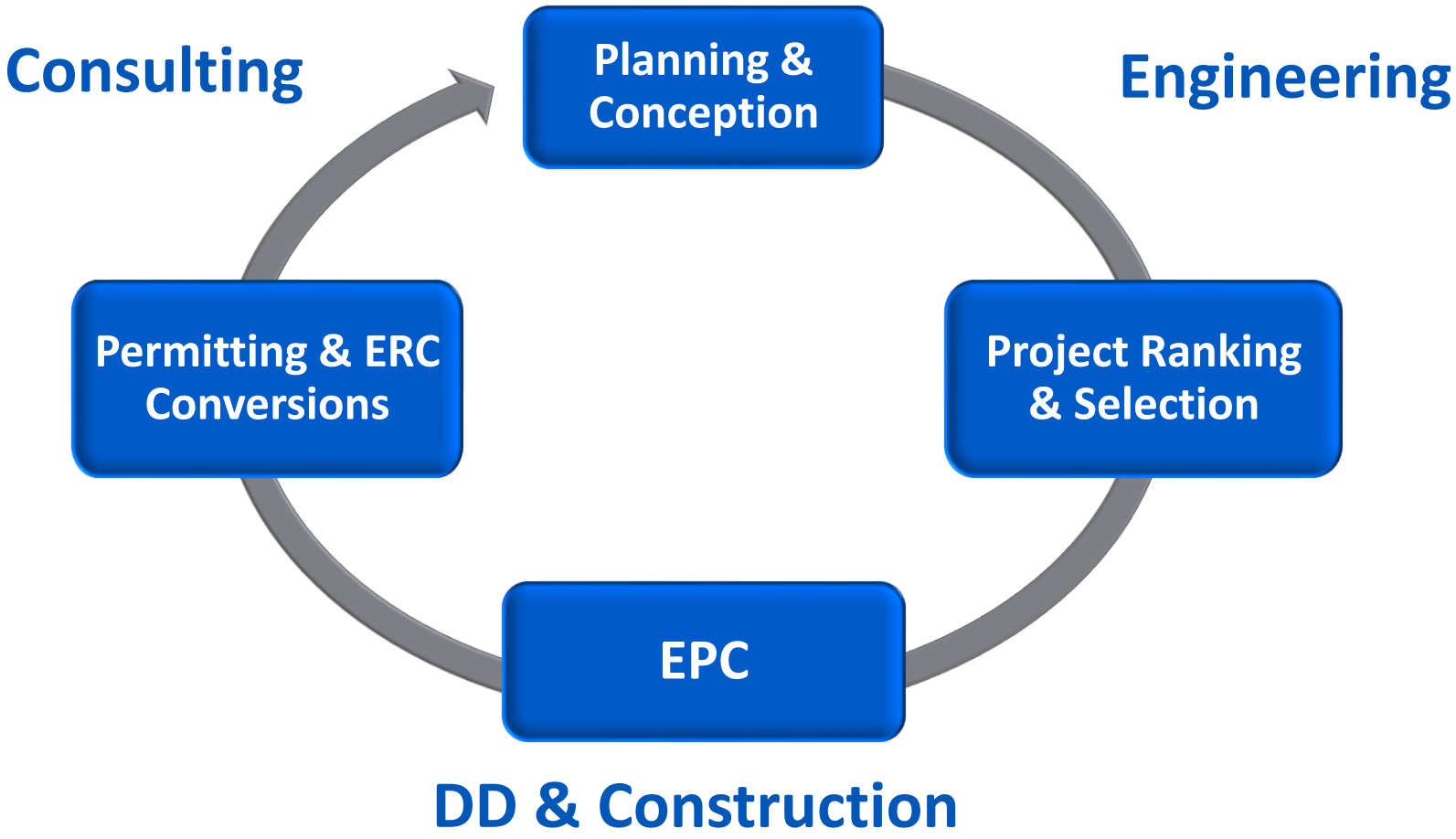
Identify & rank control opportunities to achieve…

- **Confidence:**
  - manage risk to future project feasibility, cost, schedule with identified ERs ready when needed – improve position for site selections
- **Value:**
  - estimate project costs for comparison to market value
  - market value could justify controls for revenue
  - net out to avoid LAER costs and choose best control spend
- **Speed:**
  - net out to avoid nonattainment and PSD permit delays
  - positioned to execute projects when needed

Process: Steps to Evaluate/Rank Control Costs

1. **Define** actual or potential pollutant/program needs
2. **Identify** sources with credible control options
3. **Validate** selected SIP baseline actual emissions
4. **Scope and estimate** control project CAPEX/OPEX
5. **Quantify** emission reduction and cost/ton
6. **Normalize** cost/ton for comparison
7. **Rank** control options along key decision-making axes

Execution: Typical Control Project Cycle and Resource Needs



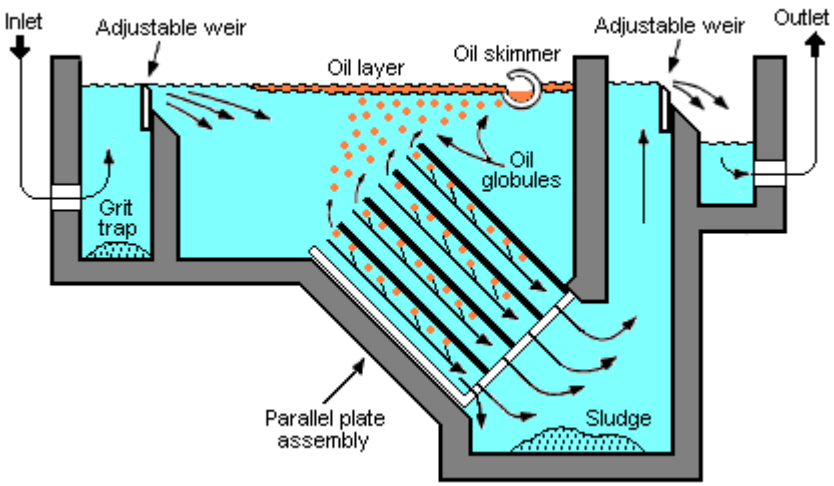
Example: EPC Control Projects

- **Storage tanks**: domed roof on EFR, IFR upgrades
- **Flares**: vapor recovery, reroute to oxidizer
- **Wastewater systems**: enclose, add controls
- **Fired units**: replace, retrofit, fuel treatment
- **Other sources**: add/replace control device
- **Process changes**: solvent/material substitution, heat recovery and integration

Example: Potential Lower Cost Options

Evaluate and optimize key utility systems:

- **Flare headers**: flow contribution evaluation, replace PSVs, reduce sweep gas & inert gas flows, analyzer sample loops
- **Steam distribution**: steam trap study, improve thermal efficiency and reduce boiler firing demand
- **Wastewater**: reduce inert gas flows, constant-level controls, conservation vents, reflective coatings on uninsulated surfaces, operating adjustments



Example: Value Captured by One Project

Houston area facility:

- **Problem**: strategic project needed large VOC emission reduction to permit construction
- **Market cost**: budgeted ~$50M
- **Solution**: internal control options evaluated, new VOC control device installation opportunity identified
- **EPC cost**: preliminary engineering estimate <$15M
- **Savings**: >$35M

Tips and Takeaways

- **Appreciate strategic implications** of emissions credit and netting programs for projects: worthy of investment
- **Secure resources** needed for complex, innovative evaluations and decision-making tools
- **Define** the problem, potential problem set, or opportunity
- **Make internal control plan** by evaluating/ranking options
- **Integrate** control plan with long-term permit strategy and credit/allowance planning
- **Maintain** control plan with tools designed to respond… change is the only constant

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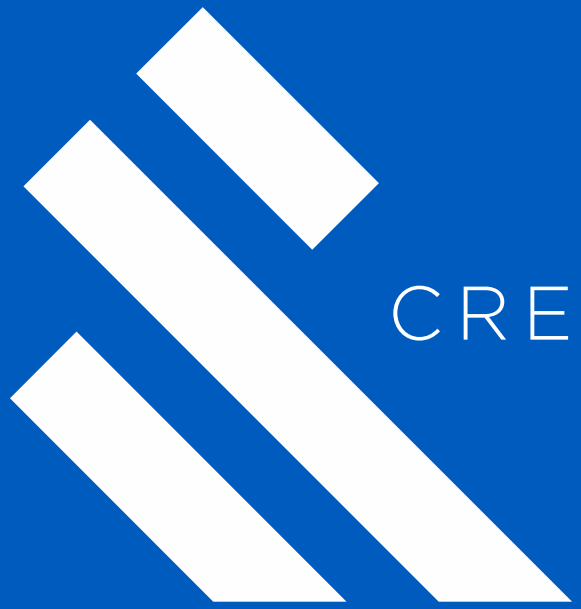

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