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Converting Challenges into Opportunities: Software for Distributed Methane Abatement

California Air Resources Board
Symposium on Methane Emissions from Natural Gas Systems
Cap-Op Energy

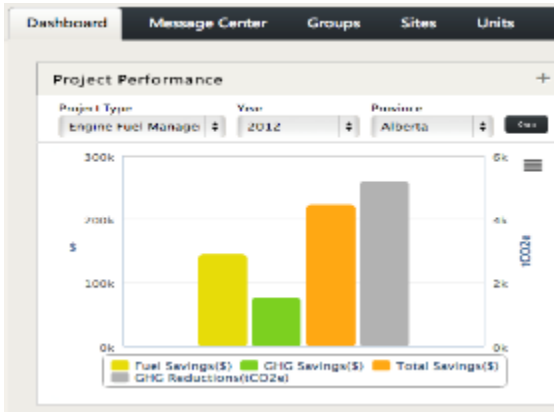
Making Sustainability Profitable… for California

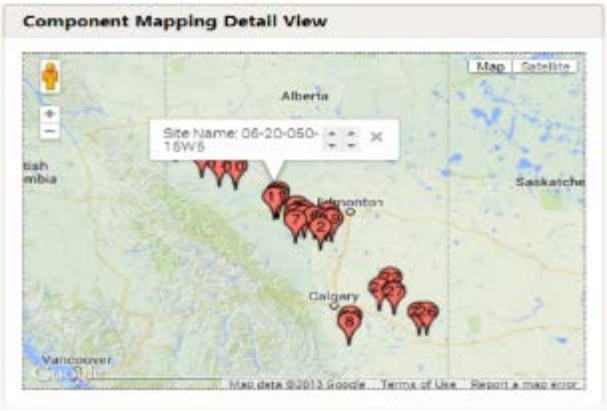
- Objective:
  - Reduce carbon intensity of natural gas delivered to California
- Sector Requirements
  - Tools to streamline planning and implementation (MAP)
  - Site access and proven technologies
  - Robust quantification tools (DEEPP)

About Cap-Op Energy

Sustainability Made Profitable

Mission: To simplify sustainability in the energy sector with ***intelligent tools*** and ***strategic thinking***.





Cap-Op Energy has developed the premier energy efficiency platform for the oil & gas industry to automate and standardize the quantification of greenhouse gas credits (carbon offsets) from data acquisition through to verification and reporting. It offers significant savings and risk reduction to customers by coupling the power of cloud computing and project aggregation with years of industry expertise and best practices.

The Challenge

Mandate: 45% reduction in methane emissions from O&G by 2025 (National and sub-national)

- 45% of what? Small emission sources not well documented, but contribute significant proportion of methane venting
- Compliance (abatement) costs will range from **$2/t CO_2e to $160/t CO_2e (10 year)**
- Distributed methane abatement solutions available to address massive hi-bleed fleet
- Costs and information are the barriers - finding and scoping small projects is challenging

Scope of Opportunity

GHG Emitting Equipment	Total Alberta Equipment Count	Estimated Eligible Alberta Equipment Count	GHG Efficient Alternatives	Average Emissions Reduction (annual)	Average Capital Cost (Installed)	Estimated Total GHG Reduction Potential (over 10 years)
High-bleed instruments	369,067	115,000	Low-bleed instruments	40 tCO_2e	$1,000 - 2,500	46,000,000 tCO_2e
Pneumatic Pumps	172,302	150,000	Low/No-bleed pumps	75 tCO_2e	$10,000 - 25,000	112,500,000 tCO_2e
Solution Gas Venting	19,000	8,000	Well site vent gas capture	500 tCO_2e	$20,000 - $60,000	40,00,000 tCO_2e
Vent gas (Engines)	31,968	10,000	Vent gas capture	1000 tCO_2e	$50,000 - $250,000	100,000,000 tCO_2e
Natural gas combustion engines	31,968	6,000	Air-fuel ratio controllers	600 tCO_2e	$150,000 - $300,000	36,000,000 tCO_2e
Total						**335 million tCO_2e**

"Lowest Hanging Fruit" (Current Opportunity) — **"Next Best" (Opportunity for Future Expansion)**

Sourced from Alberta's Upstream Oil & Gas Assets Inventory Project – Opportunities to Reduce GHG Emissions. 2013.

Alberta Innovates Energy and Environment Solutions

PTAC Petroleum Technology Alliance Canada

The Opportunity

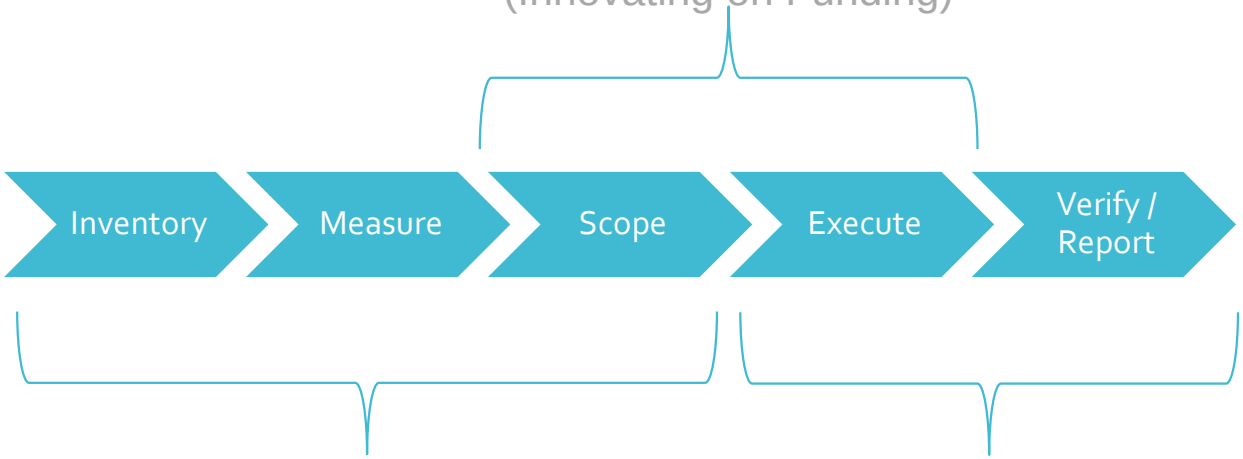
Our data confirm **pneumatic device conversions** are the $2/t to $10/t projects - and there are *hundreds of thousands to do*

- Cap-Op is working to help companies abate distributed methane emissions
  - Planning tool for low-cost execution
  - Robust emissions quantification
  - Carbon-backed project financing
- Regulatory framework can drive work
  - Carbon pricing drives economics
  - Upstream -> across jurisdictions
  - End-use in CA, benefits to CA

Distributed Methane Abatement Workflow

Carbon-Backed Project Financing

(Innovating on Funding)



MAP

(User Engagement & Software Development Underway)

DEEPP

(Operational)

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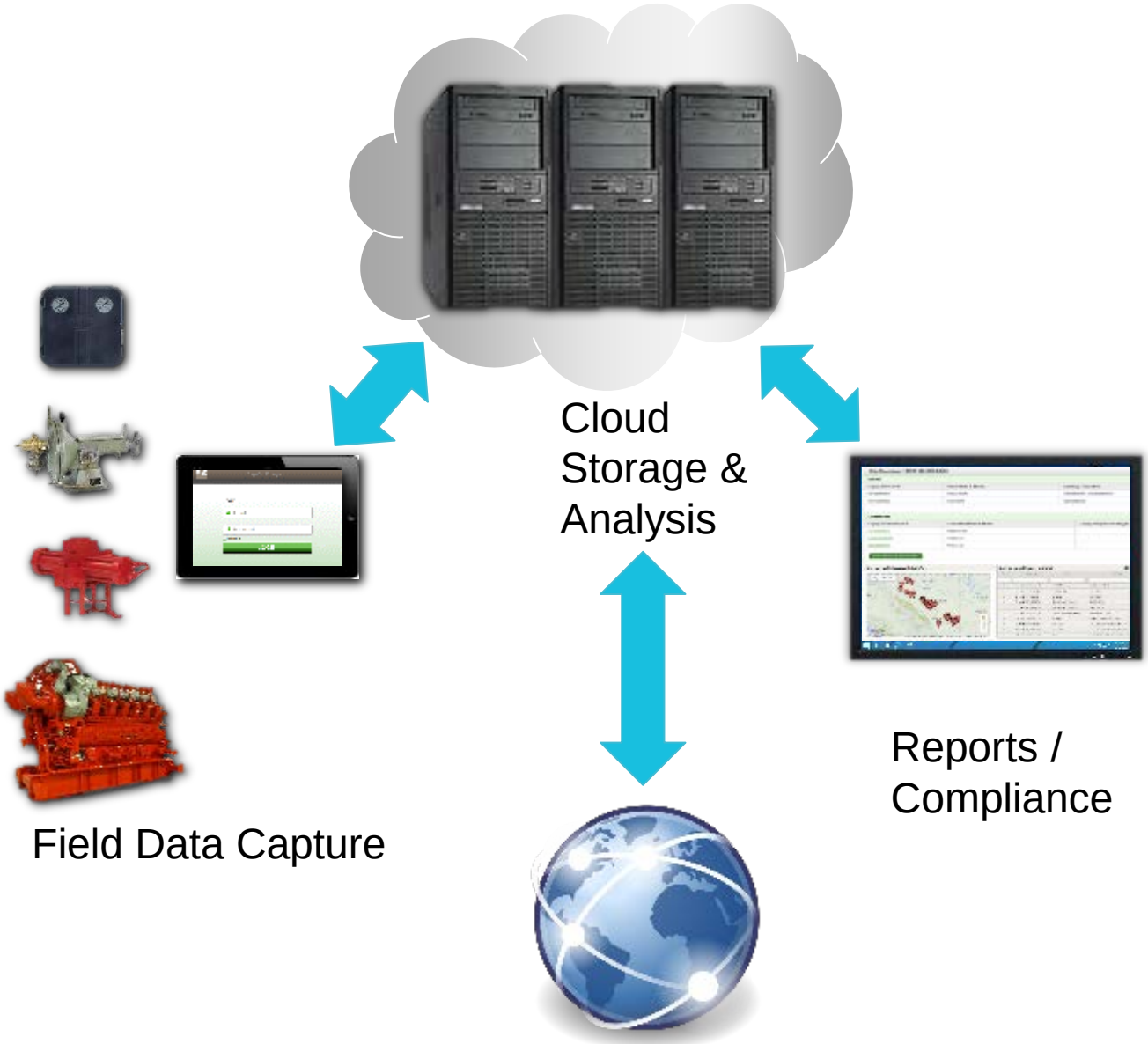
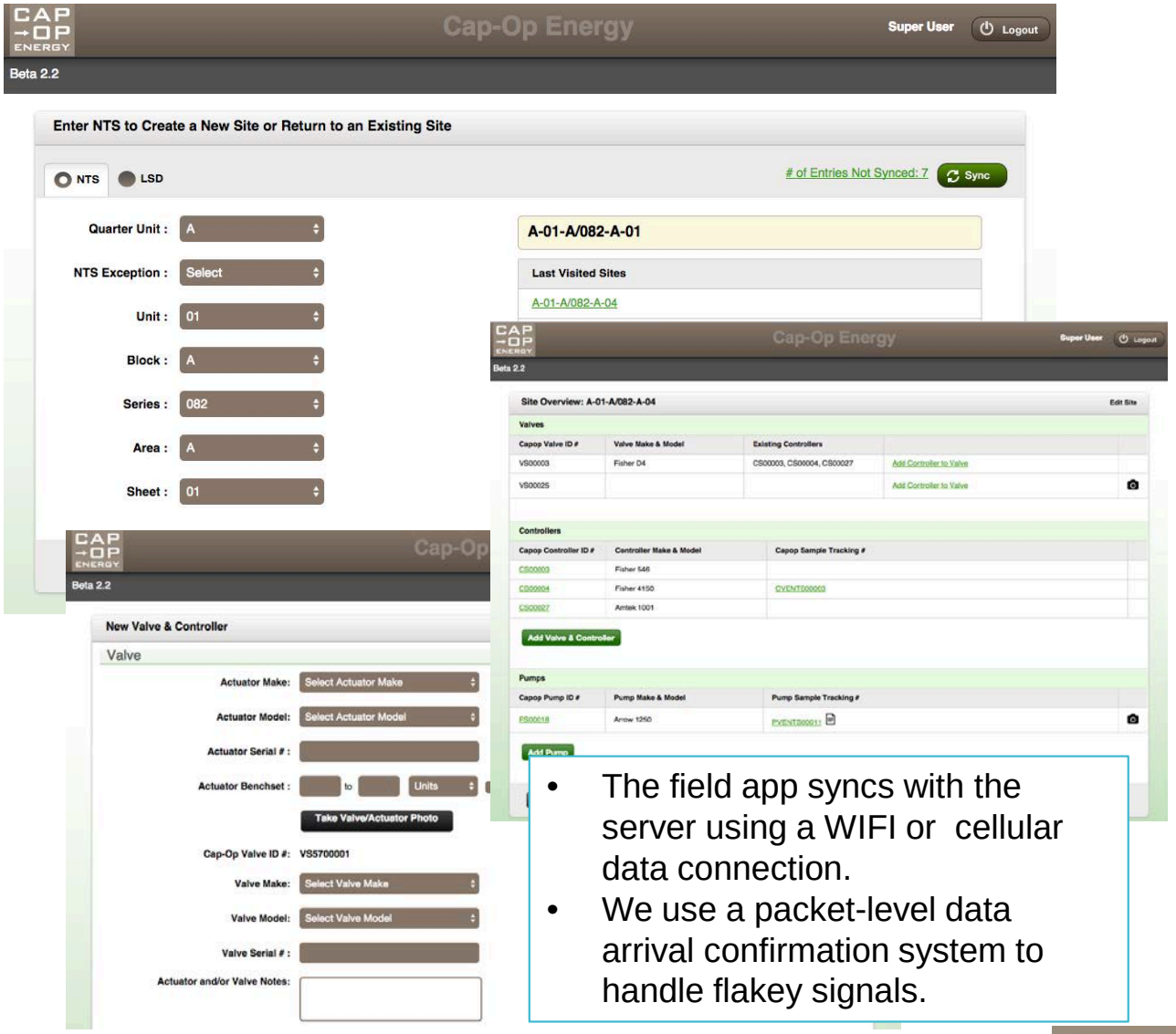
Methane Abatement Platform



MAP: Field Data Collection

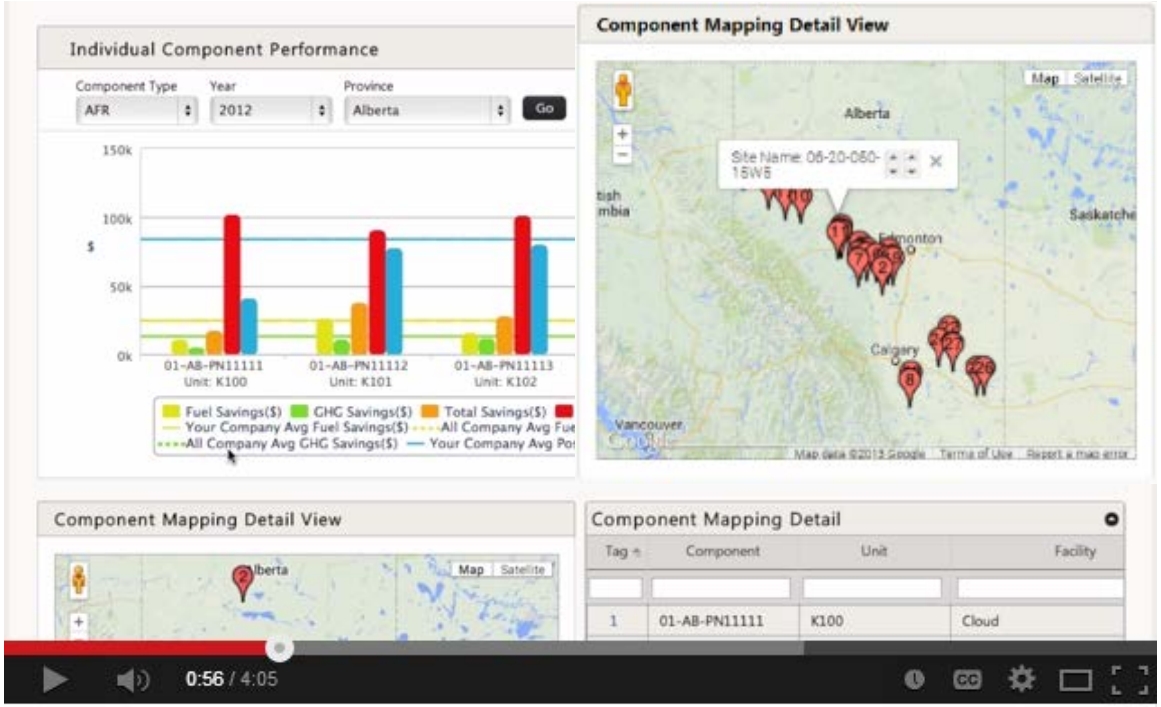


- The field app syncs with the server using a WIFI or cellular data connection.
- We use a packet-level data arrival confirmation system to handle flakey signals.

MAP: Back-end Tools

- Utility Analysis:
  - Gas pipelines / Co-op lines (conservation)
  - Disposal and storage wells (abatement / conservation)
  - Electricity lines (conservation via power generation or electrification)
- Clustering Analysis:
  - Methane destruction and conservation opportunities
  - Simple communication among diverse stakeholders
- Campaign Planning:
  - Route optimization
  - Equipment and tools available
  - Tracking and accounting progress (no double conversions)

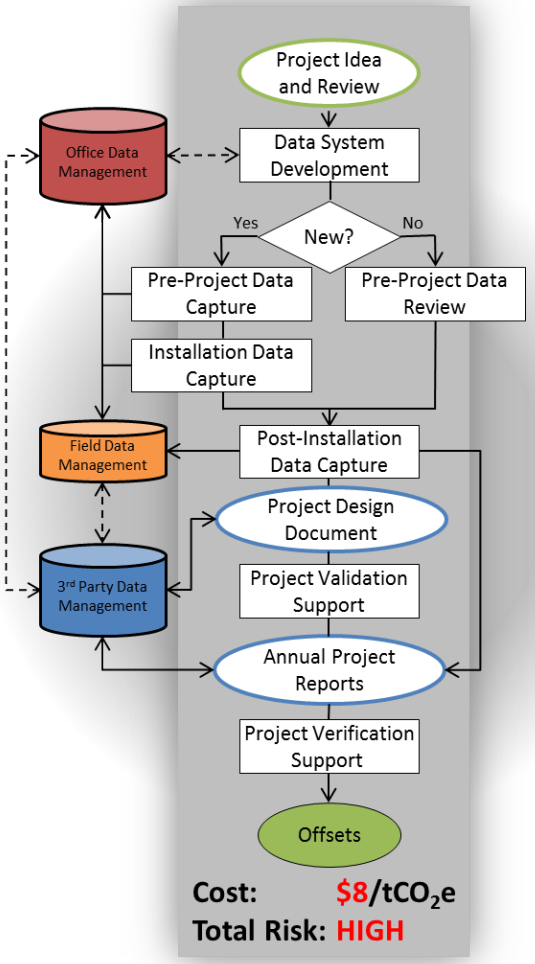
Distributed Energy Efficiency Project Platform (DEEPP)



Cap-Op Energy Distributed Energy Efficiency Project Platform (…

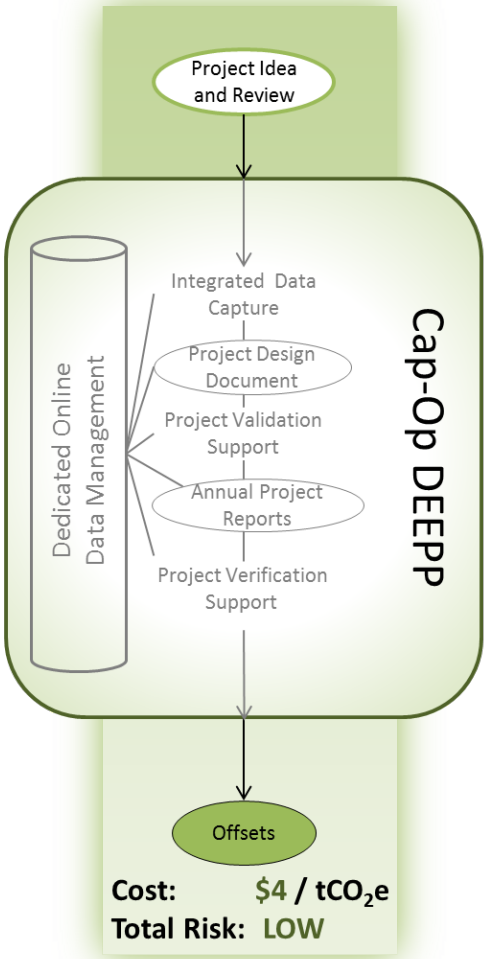
DEEPP Process

Conventional Process



- x Inefficient
- x Expensive
- x High Risk

DEEPP Process



- ✓ Streamlined
- ✓ Cost Effective
- ✓ Low Risk

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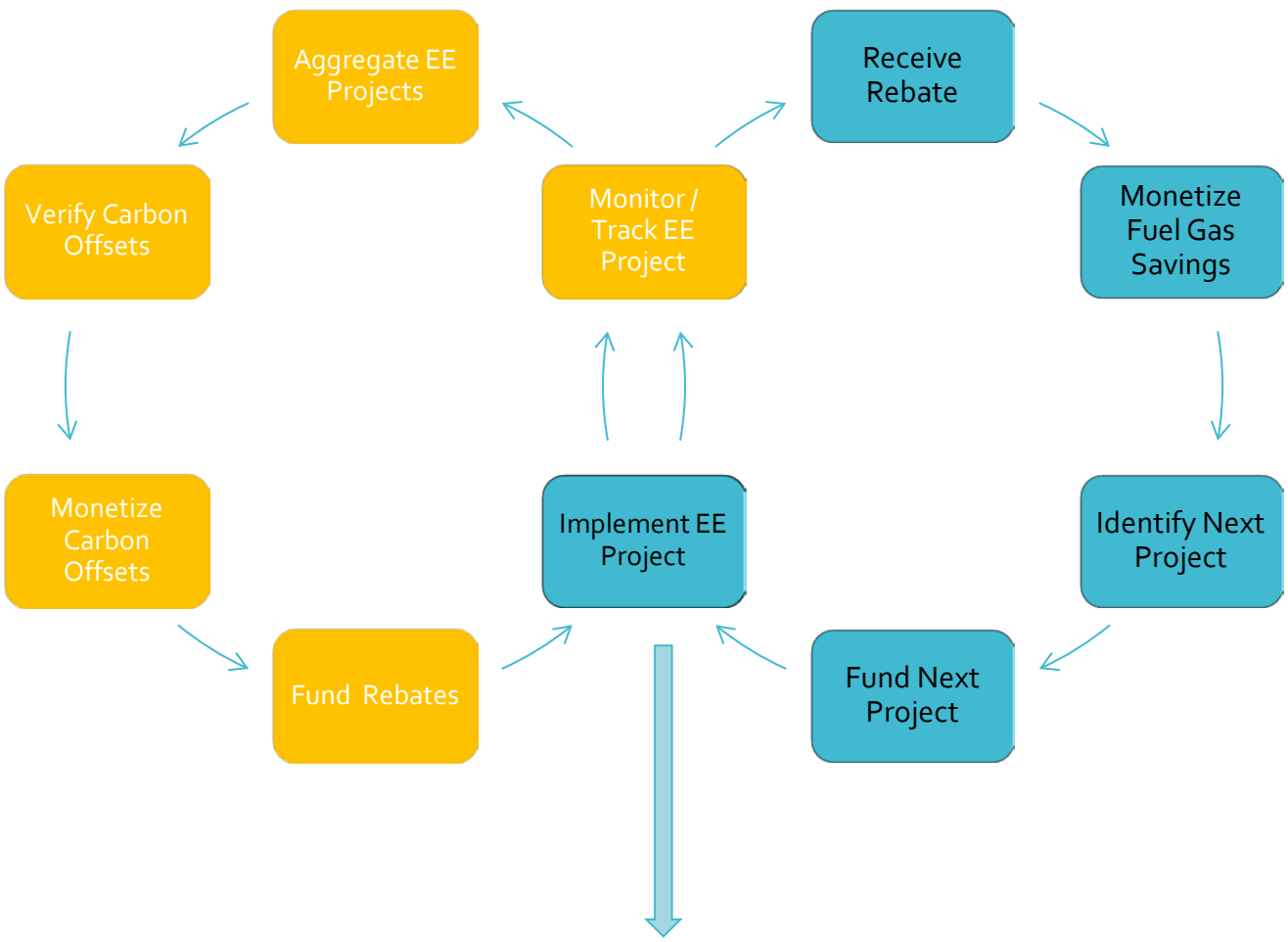
Carbon-Backed Project Finance



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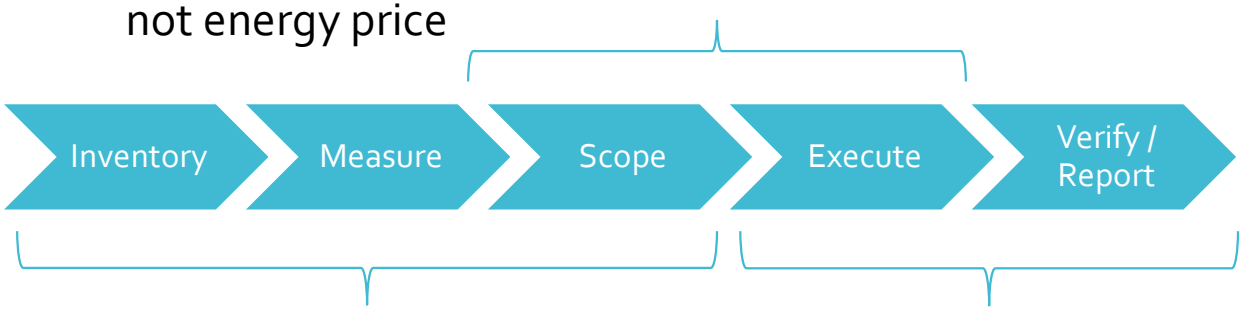
Carbon-Backed Project Financing

Cap-Op Tools Support Low-Carbon Natural Gas

- Accelerate projects based on carbon price, not energy price
- Leverage 3rd party funds for project capital



MAP

- Improve accuracy of methane emission reporting / carbon intensity estimates through enhanced granularity
- Decision support tool for identifying, evaluating and prioritizing methane abatement programs

DEEPP

- Robust quantification of distributed emissions
- Aggregated verification of emission reductions
- Project management and performance tracking
- Industry benchmarking

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Making Sustainability Profitable… for California

- Objective:
  - Reduce carbon intensity of natural gas delivered to California
  - Mitigate risk of capital flows out of the state.
- Sector Requirements
  - Tools to streamline planning and implementation (MAP)
  - Site access and proven technologies
  - Robust quantification tools (DEEPP)
  - Supportive regulatory framework (carbon pricing / incentive)

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