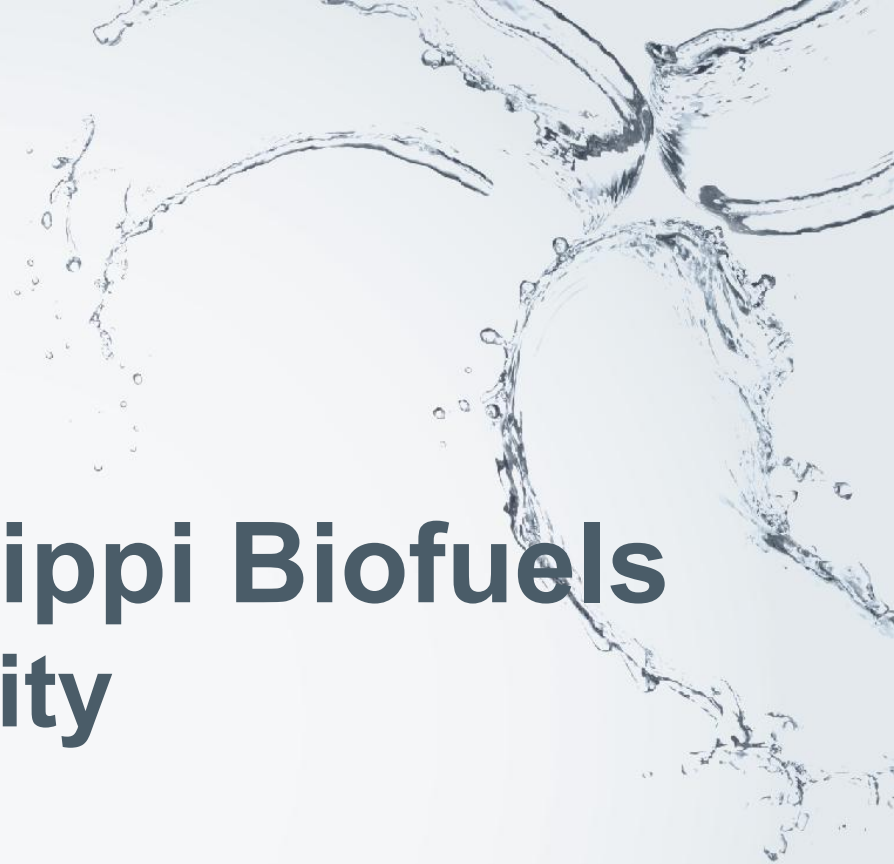


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Enerkem Mississippi Biofuels Pontotoc, MS Facility

2013 IBR Peer Review

May 21st, 2013

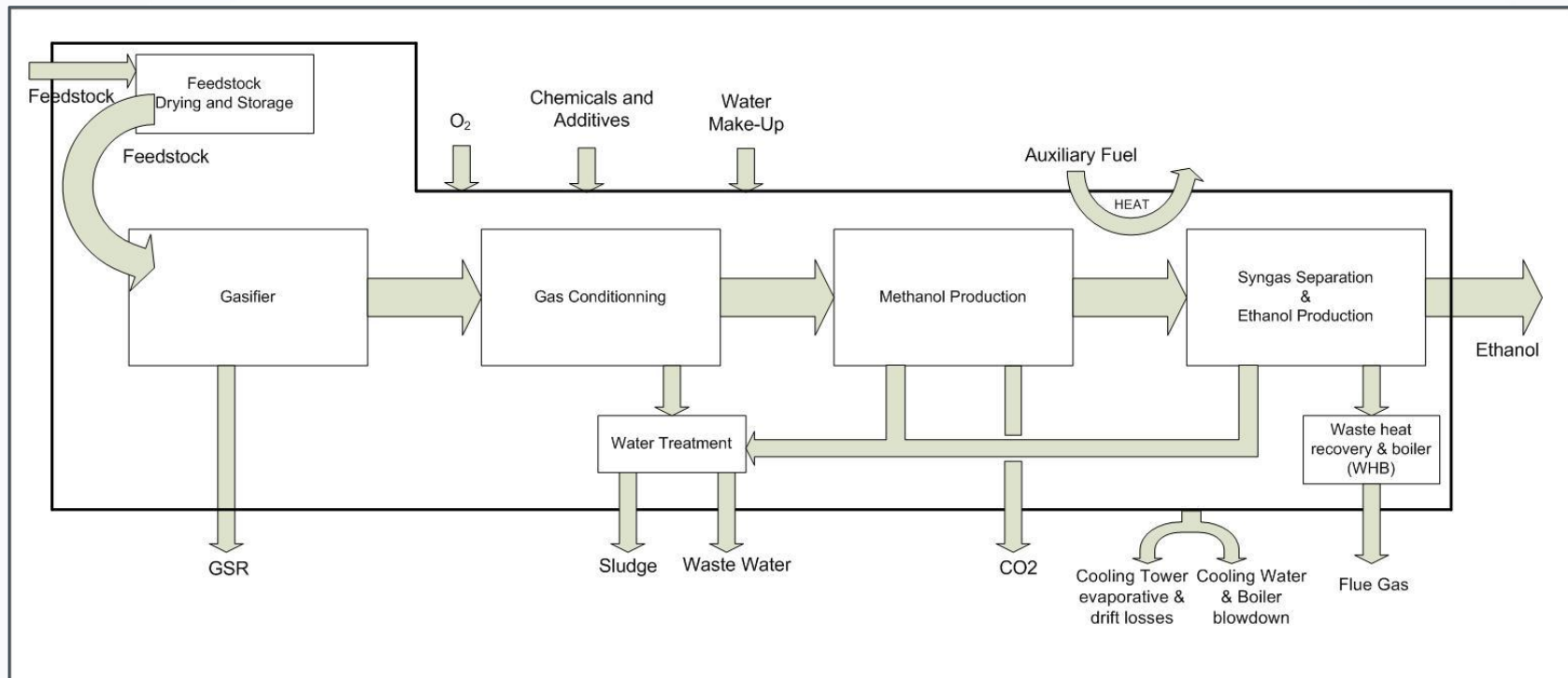
Tim Cesarek

Senior Vice President, Business Development



Project description

- 🌀 Project location: **Pontotoc , Mississippi, US**
- 🌀 Company headquarters: **Montreal, Quebec, Canada**



Feedstock input - 115K dry M.T/year¹ | over 10 million gallons of ethanol

(1) 115,000 bone dry metric tons/year = (350 tons/day x 365 days x 90.75% availability)

Quad chart overview

Timeline

- 🌀 Project start
 - BP1 – Jan 2010, BP2 – June 2013
- 🌀 Project end date:
 - Mechanical completion: Q4 2014
 - Commissioning: Q4 2014– Q1 2015
 - Start up: Q1 2015
- 🌀 Project progress
 - Basic engineering = 95% complete, Detailed engineering = 60% complete
 - Equipment vendors identified. Long lead items ready for bids

Budget

- 🌀 Total project funding
 - DOE share: \$50M
 - Owner cost share: \$73.5M¹
 - USDA loan guarantee: \$80M²
- 🌀 Funding received by Fiscal Year
 - FY 2010 = \$2.2M, FY 2011 = \$1.5M, FY 2012 = \$1.2 M
 - 100% ARRA funding

Project Development

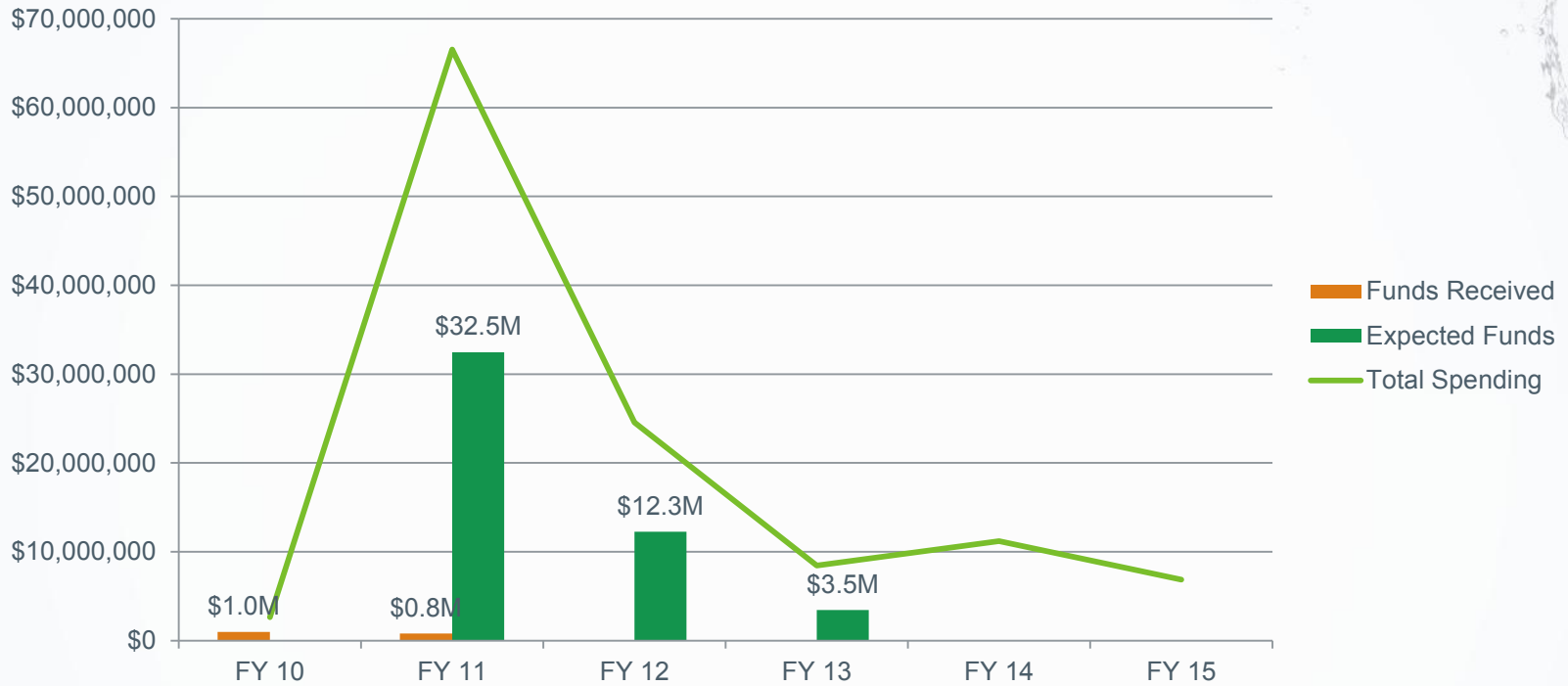
- 🌀 Project scope expanded to utilize locally sourced residual woody biomass as feedstock
- 🌀 Strategy aligned with timing of partner to install MSW infrastructure. Project will incorporate MSW within a 5 year period
- 🌀 Further de-risking by additional technology confirmation (ethanol pilot). Schedule adjusted to benefit from learnings of EAB
- 🌀 Expected completion: Q1 2015
- 🌀 Months of operation planned : 8

Project Participants

- 🌀 Enerkem
 - Engineering, project and construction management
 - Start-up and commissioning
 - Operations
- 🌀 FC&E - Permitting
- 🌀 Lauren Engineers - Engineering consultants
- 🌀 Three Rivers Solid Waste Management Authority
- 🌀 Various residual woody biomass suppliers

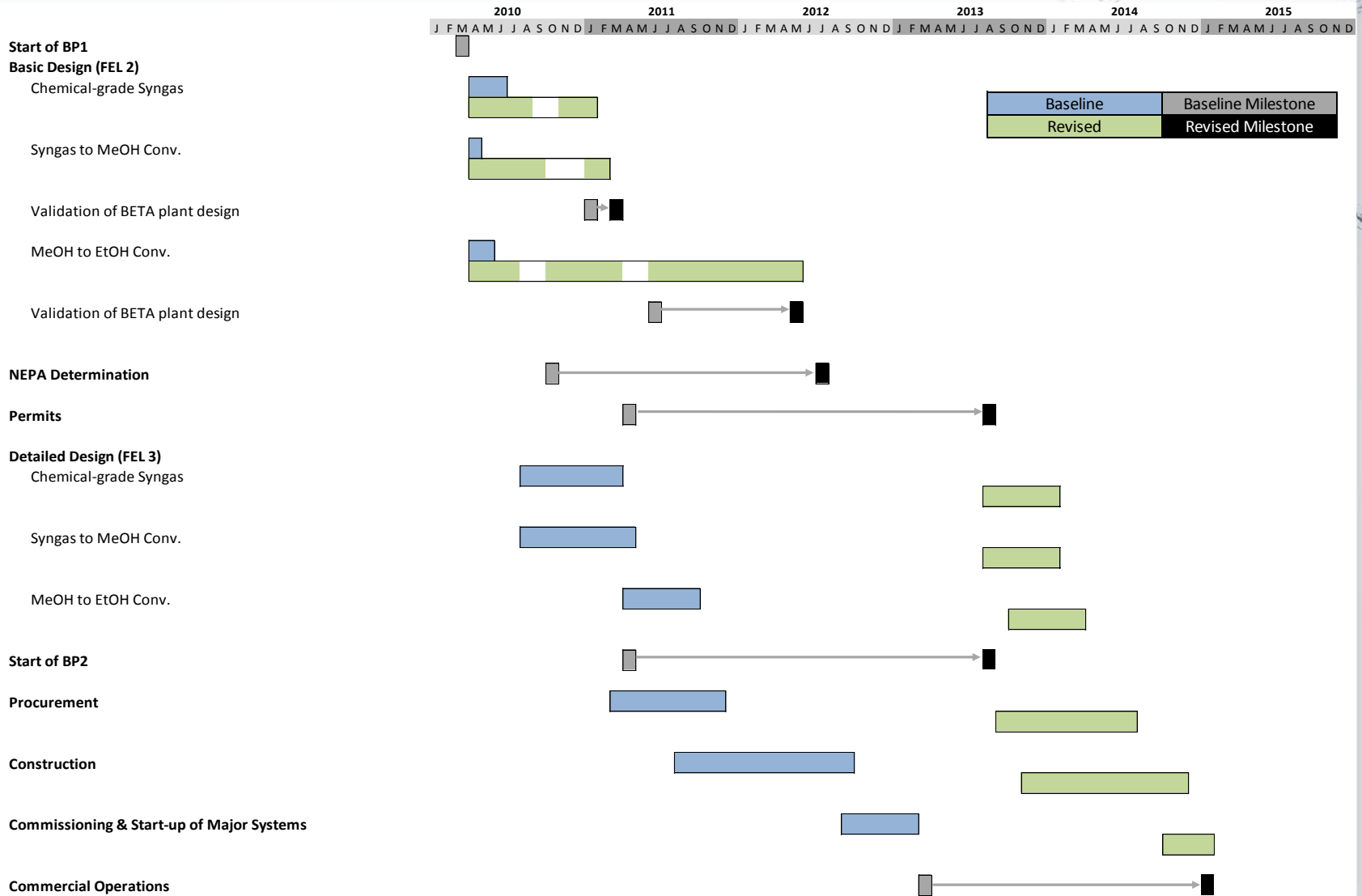
(1) Total approved project cost ~ \$123.5 million
(2) USDA conditional loan guarantee commitment

Cost performance – spend plan



Notes: Last DOE approved spend plan

Project overview - schedule



Project management

🌀 Project Management

- Project Management Office with emphasis on schedule and cost control
 - ✓ Integration of Primavera Project Management P6 for scheduling and contract management module for cost control and vendor documentation control
- Supply chain department integrating procurement, logistics and contract management with system engineering to integrate deliverables for module fabrication
- Lessons learned from Enerkem's projects used to further mitigate project risks (procurement, modularization needs, logistics, start-up and commissioning)
- BP2 acceptance from the DOE (Q1 2013)
- Increased staff on detailed engineering and built a strong expertise in modularization with current projects
- Transition of seasoned project management team from EAB to EMB

Technical accomplishments / progress / results

🌀 Technology – Enerkem Demonstration Facility:

- Demonstrated over 1,500 hours of reliable and robust RDF fluff feeding system to gasifier – achieved
- Design conversion criteria – yields of 90-95 gallons/short ton achieved
- Production of chemical grade syngas produced from biomass, Waste wood, MSW and C&D RDF fluff suitable for catalytic synthesis – achieved design conversion criteria
- Conversion of syngas to methanol using integrated thermal-catalytic route – achieved design conversion criteria
- Production of ethanol fuel grade from MSW derived methanol – achieved design conversion criteria

Technical accomplishments / progress / results

🌀 Engineering – Enerkem core process

- Detailed modular design of gasification and methanol islands completed
 - ✓ Includes structural, all piping isometrics, instrumentation and electrical
- Process design completed for ethanol island and detailed modular design proceeding
- Process control and safety management strategy integrated in the plant design – added SIS¹ to further safety management
- Vendor lists finalized for major and minor equipment
- Required utility loads defined and utility design completed

Technical accomplishments / progress / results

🌀 Engineering

- Site specific design of plant completed
- Layout remodeled for “Site B” (across Beulah Grove Road)
- New site surveying and geotechnical studies completed
- Plant water consumption and waste water strategies finalized
- Design of feedstock pre-treatment process completed

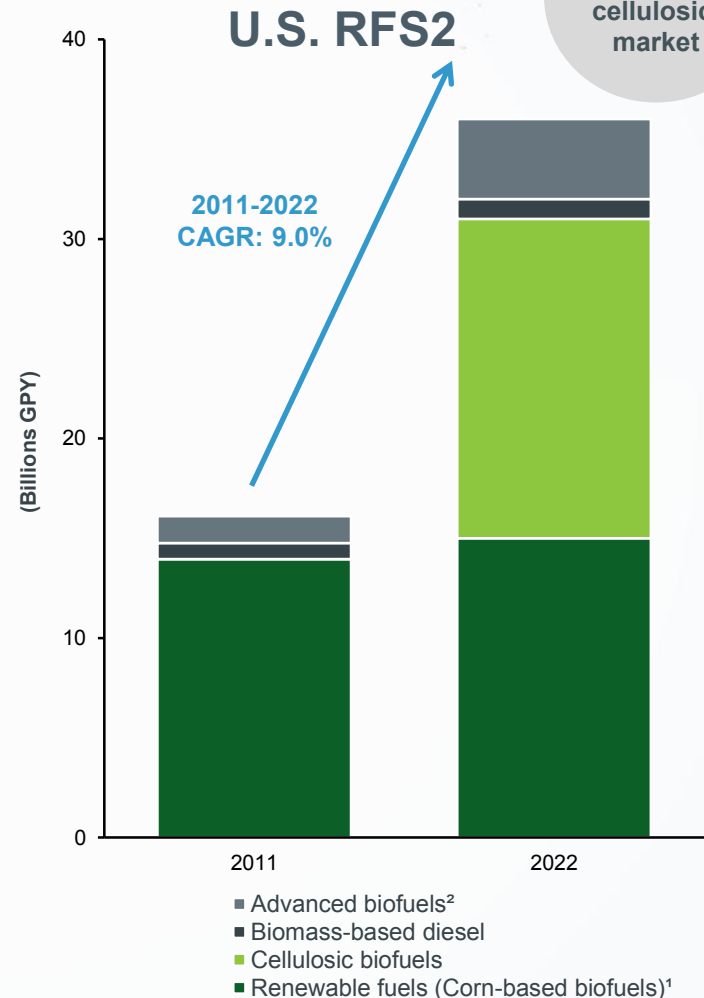
Technical accomplishments / progress / results

🌀 Project Execution

- NEPA environmental assessment process completed
- Air and storm water permits submitted for new site
- Long lead items identified and ready for purchasing
- Module fabrication shops tested & qualified
- Engineering consultant partner being selected and construction companies in pre-qualification process
- Pre-treatment process design for heterogeneous feedstock has been finalized

Relevance to Biomass Program

- ② EMB will add 10 MMGPY of cellulosic ethanol production capacity in the US. This volume will contribute to achieving the RFS2 by displacing fossil fuels through developing domestic energy production capacity
- ② The completion of the EMB demonstration facility will be a credible step as part of the first wave of advanced biofuels projects in the U.S. The advanced and cellulosic biofuels RVOs compose the vital growth portion of biofuels deployment within the RFS2



Source: Management estimates, U.S. Department of Energy

(1) Represents renewable fuels mandate less nested advanced and cellulosic biofuel mandates.

(2) Advanced biofuels mandate less cellulosic biofuels mandate (may include imported Brazilian sugarcane ethanol).

Relevance to Biomass Program (cont'd)

- ② Ethanol produced from EMB is projected to reduce greater than 80% of GHG emissions compared to conventional gasoline, based on GREET¹ and IPCC² models
- ② The successful demonstration of Enerkem's technology platform will provide a viable way to convert heterogeneous feedstocks to liquid biofuels
- ② This will enable a larger range of flexibility to utilize MSW as well as residual woody biomass resources in the US

(1) Greenhouse gases, Regulated Emissions and Energy use in Transportation
(2) Intergovernmental Panel on climate Change

Relevance to Biomass Program (cont'd)

BETO IBR MYPP Target #1

...validate a total annual production capacity of 80 million gallons of advanced biofuels

Source: MYPP, Table 1-3, Nov. 2012

- ② EMB's nameplate production capacity of 10 MMGPY will contribute to 80 MMG target¹
- ② Enerkem has developed a modular, copy-exact and scalable approach for equipment production and installation which will enable the manufacturing of multiple modules simultaneously
- ② This approach will allow the installation of additional standard 10MMGPY modules side by side

BETO IBR MYPP Target #2

...validate a mature technology plant model for cost of ethanol production based on actual integrated biorefinery project performance data and compared to the target of \$2.15/gallon ethanol (\$2007)

Source: MYPP, Table 1-3, Nov. 2012

- ② In Enerkem's standard commercial facility producing 10MMGPY, we believe that our operating costs, before depreciation and amortization, will be \$1.50 to \$1.70 per gallon, excluding feedstock cost (or \$1.87 to \$2.07 per gallon, after depreciation and amortization)

(1) EMB expected to reach a cumulative output of 10 MMGPY of cellulosic ethanol by 2017

Success factors and challenges

🌀 Critical success factors

- Learnings from commercial scale waste to biofuel plant (EAB) start-up and operation will be applied to EMB
- Robust design to ensure commercial performance, plant reliability, and product quality
- Completion of project within budget and on schedule
- Feedstock feed system integration to the biorefinery achieved at Westbury (beta facility) and AERF¹ achieved

🌀 Expected production cost

- Estimated product cash costs of \$1.50 to \$1.70/gallon, excluding the cost of feedstock

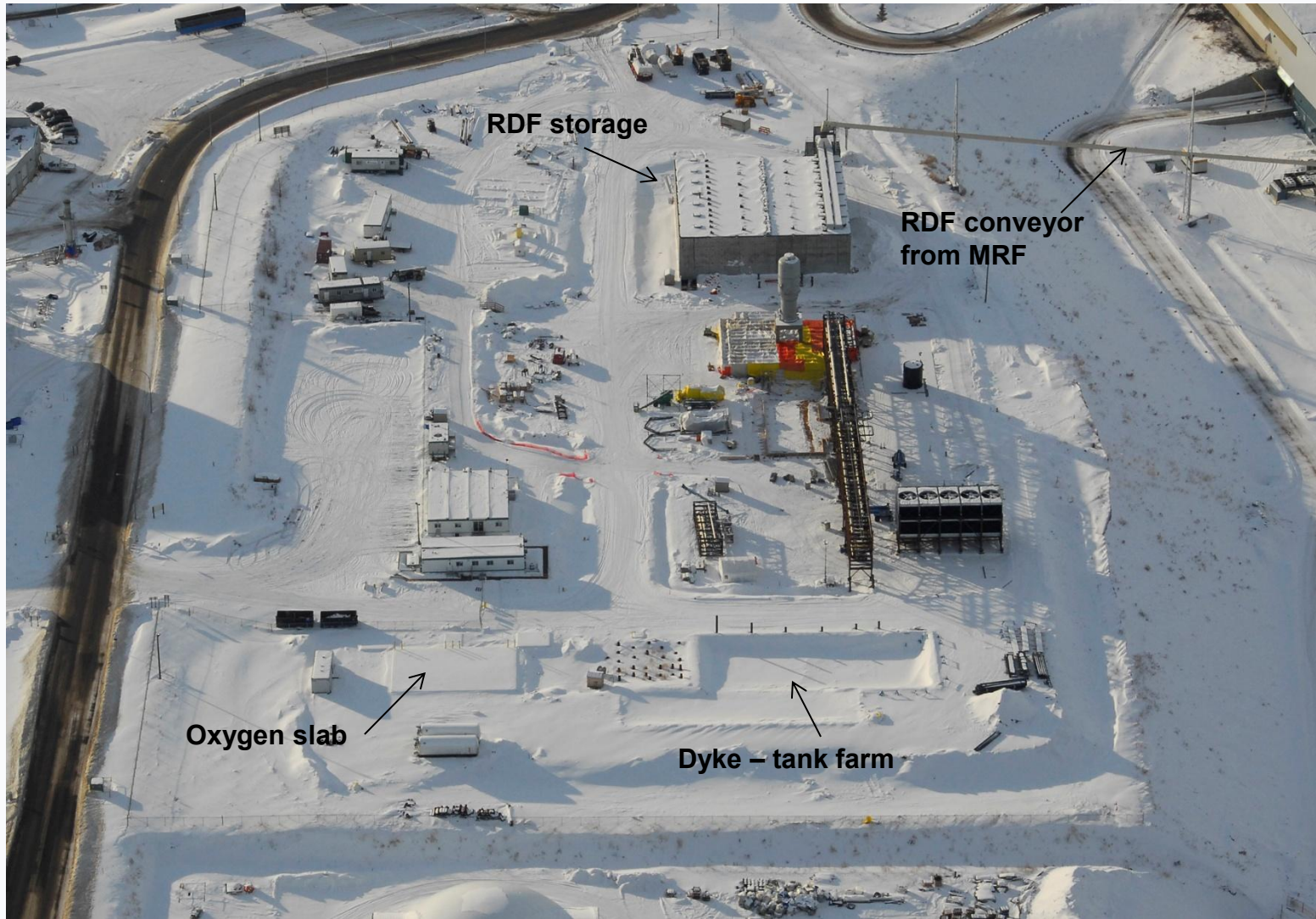
🌀 Product yield

- Facility will convert up to 115K² bone dry metric tons of feedstock into over 10MMGPY of cellulosic ethanol

(1) AERF – Advanced Energy Research Facility, City of Edmonton

(2) 115,000 bone dry metric tons/year = (350 tons/day x 365 days x 90.75% availability)

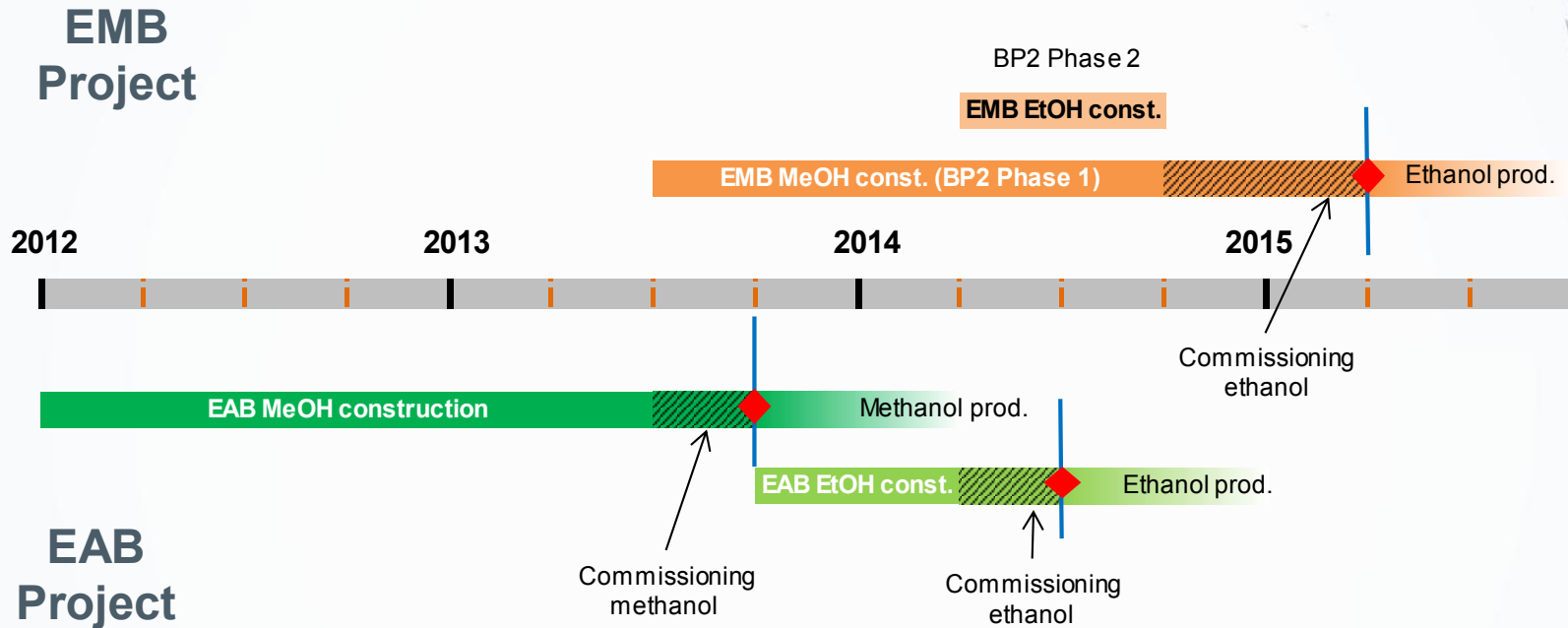
EAB progress (Jan 2013)



EAB progress *(end of Feb 2013)*



Significant reduction of risk



Learnings from Enerkem's commercial scale facility in Edmonton (EAB) will reduce deployment, start-up and operational risk for EMB, and bring in a seasoned project management team

Notes:
EMB – Start of construction: Q2/Q3 2013
Commissioning: Q3/Q4 2014
Ethanol production: Q1 2015

Future Work

🌀 In 6-9 months:

- ✓ Finalize feedstock agreements
- ✓ Complete off-take agreement with strategic partners
- ✓ Conclude the permitting efforts
- ✓ Obtain construction and project management partner
- ✓ Close equity raise
- ✓ Ordering of long lead items
- ✓ Increase Enerkem staffing at local office

🌀 In 16 months:

- ✓ Break ground and start construction
- ✓ Construction through to Q4 2014

Summary

🌀 Relevance

- EMB will add 10 MMGPY of residual woody biomass and MSW derived cellulosic ethanol production capacity in U.S
- Successfully demonstrate a platform to convert heterogeneous feedstock (MSW & residual woody biomass) into liquid biofuels

🌀 Approach

- Risk adjusted approach to project execution
- Significant reduction of execution, commissioning and start up risk by integrating learnings from EAB to EMB

🌀 Technical accomplishments

- Demonstration of over 1,500 hours of robust and reliable RDF fluff feeding system
- Production of clean, chemical grade syngas from biomass, MSW and C&D RDF fluff suitable for catalytic synthesis

🌀 Success factors and challenges

- Feedstock agreements and equity financing

Glossary

- ⌚ **BP1 and BP2** – Budget Period 1 and 2 - DOE project phases
- ⌚ **C&D** – Construction and demolition
- ⌚ **EAB** – Enerkem Alberta Biofuels
- ⌚ **EMB** – Enerkem Mississippi Biofuels
- ⌚ **EtOH** – Ethanol
- ⌚ **MeOH** – Methanol
- ⌚ **MSW** – Municipal solid waste – non-food, sustainable feedstock
- ⌚ **RDF** – Refuse derived fuel
- ⌚ **RVO** – Renewable volume obligation (RFS2)