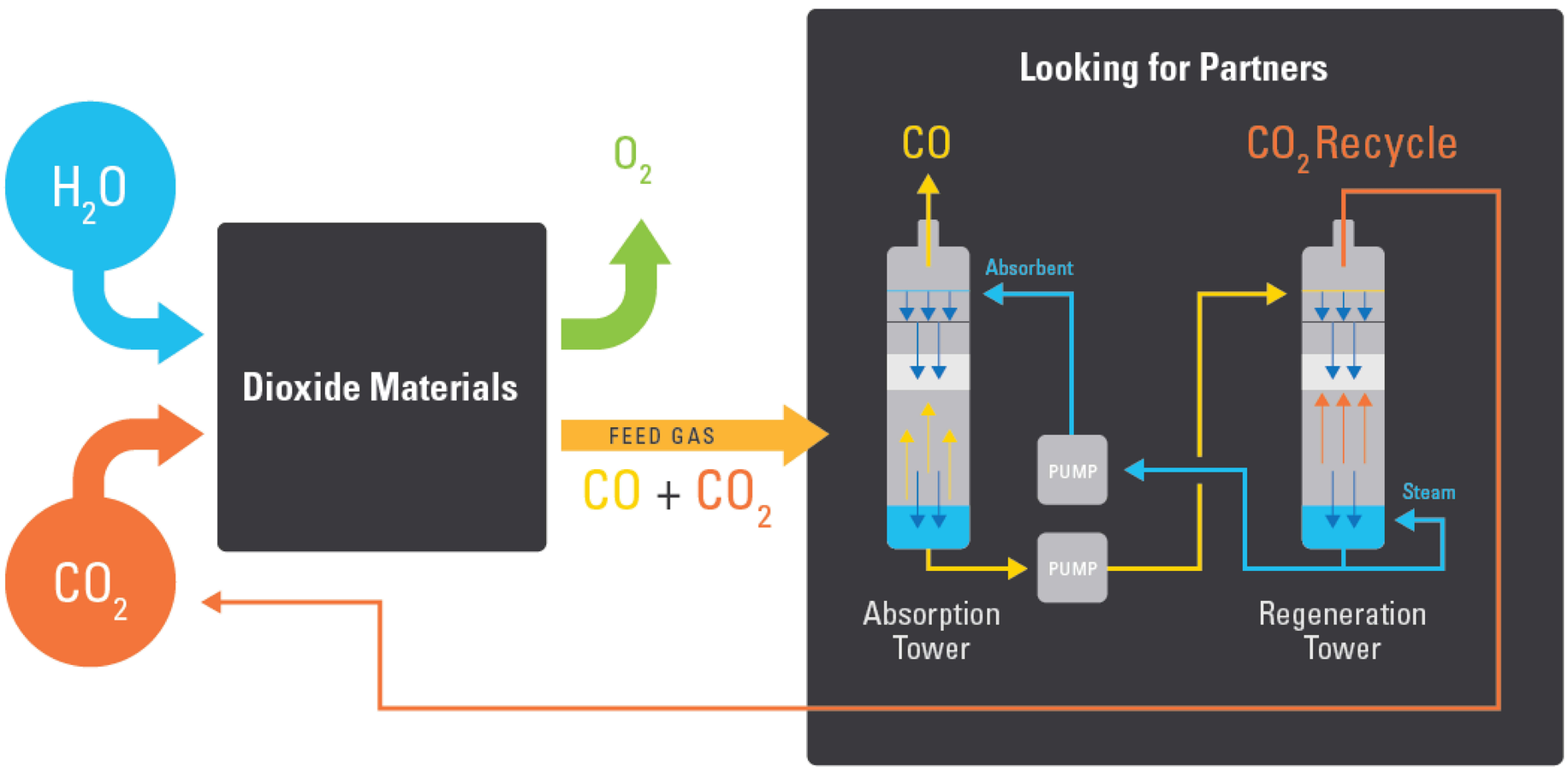
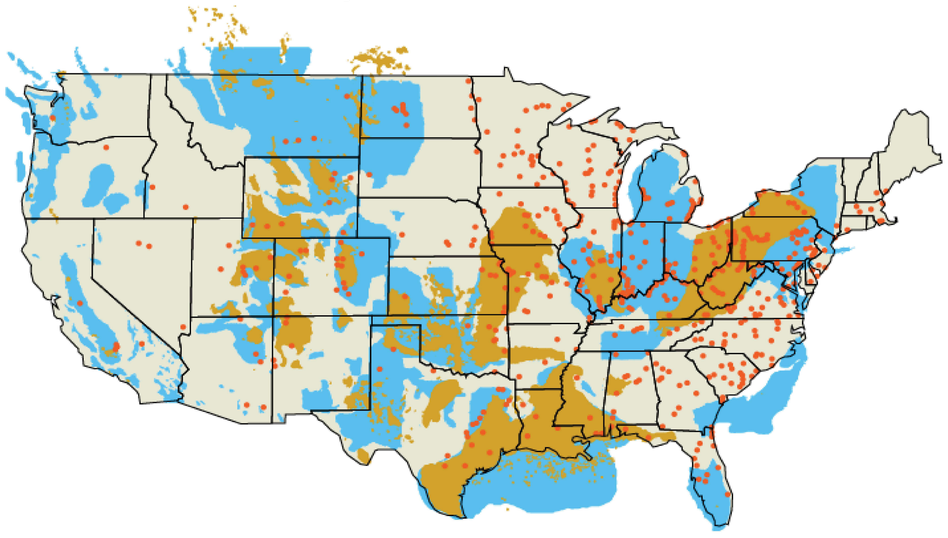
Dioxide Materials

Subrecipient 3M

Dioxide Materials Process



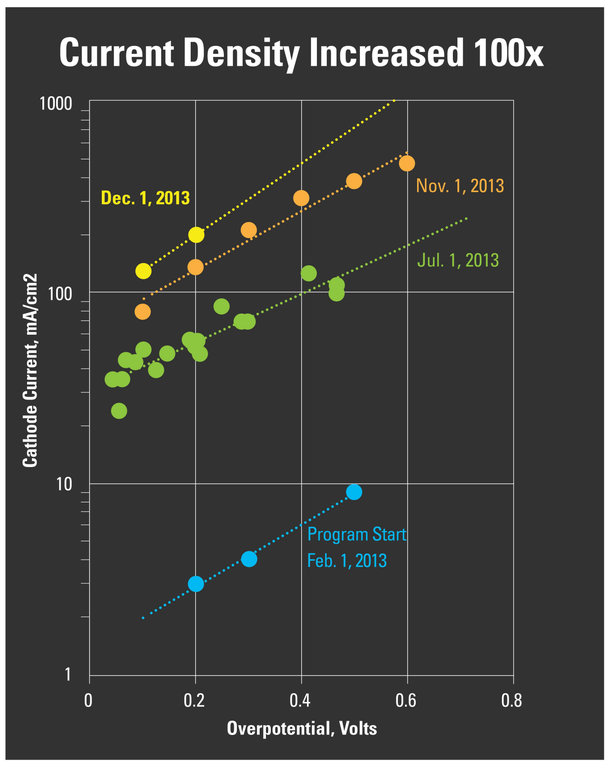
Utilization provides a route to carbon storage when no sequestration site is nearby.



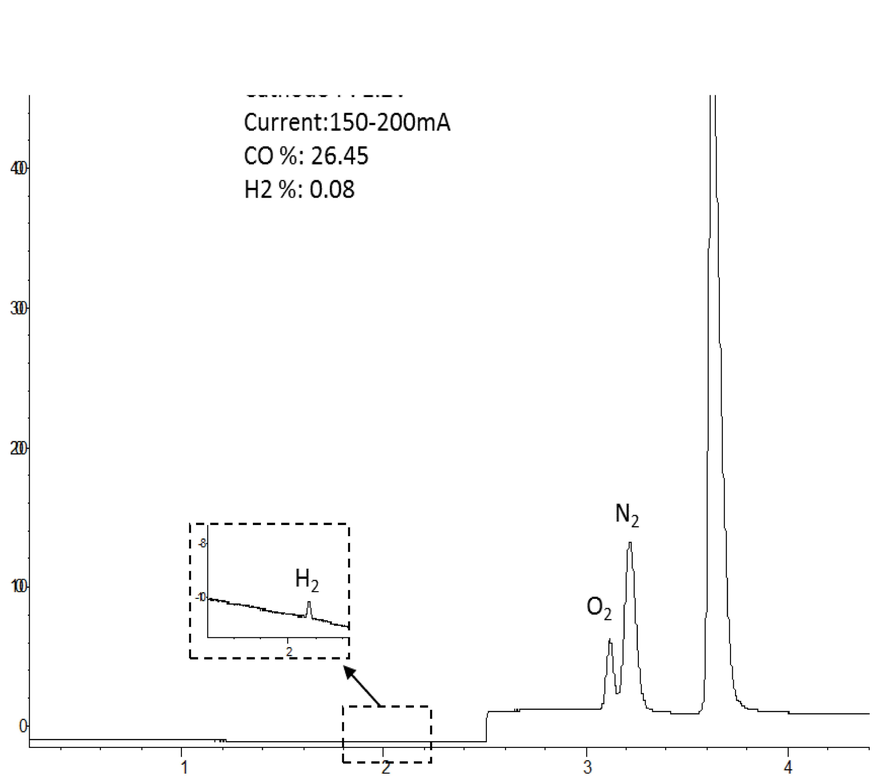
CO_2 is an inexpensive carbon source.

- Carbon from CO_2 costs $73/MT
- Carbon from natural gas costs $240/MT
- Carbon from oil costs $770/MT

High Current Densities at Low Overpotentials



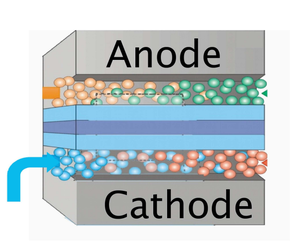
Selectivity >99%



How Does It Work?

CO Formation On Silver

$H_2O \rightarrow 2H^+ + 2\ e^- + ½\ O_2$

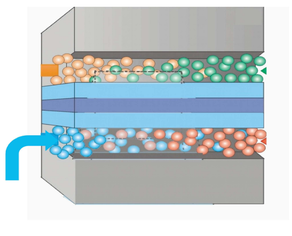


O_2

$CO_2 + 2H^+ + 2\ e^- \rightarrow CO + H_2O$

HCOOH Formation On Tin

$H_2O \rightarrow 2H^+ + 2\ e^- + ½\ O_2$



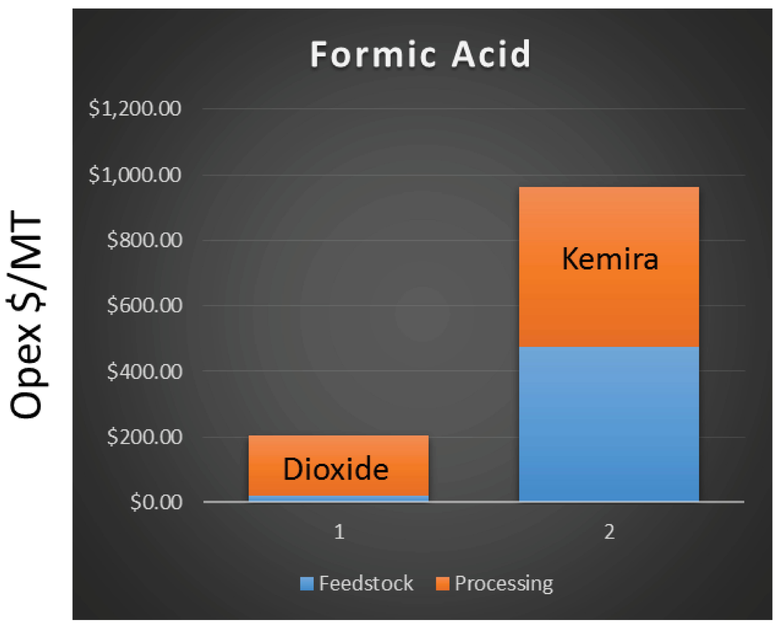
O_2

$CO_2 + 2H^+ + 2\ e^- \rightarrow HCOOH$

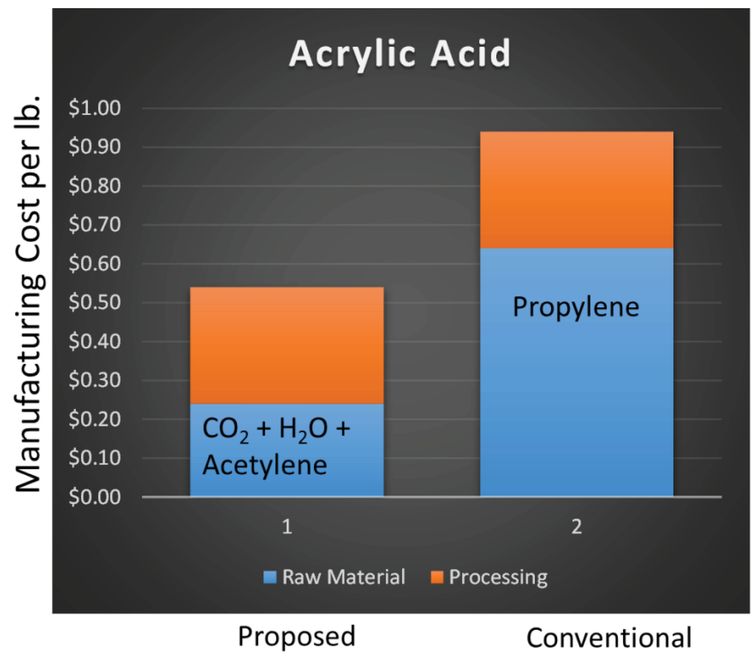
Dioxide Materials

Subrecipient 3M

Route to large volume chemicals



A comparison of the projected operating expenses for our process compared to the operating costs of the conventional process for formic acid. Ours is less expensive because we are using inexpensive feedstocks.



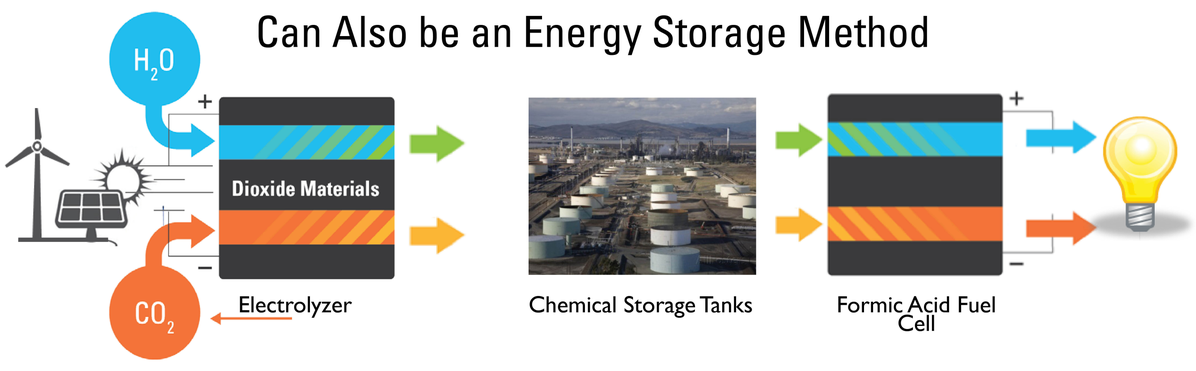
A breakdown of the operating costs to produce acrylic acid from propylene and from CO $_2$ and acetylene.

The ARPA-E Program

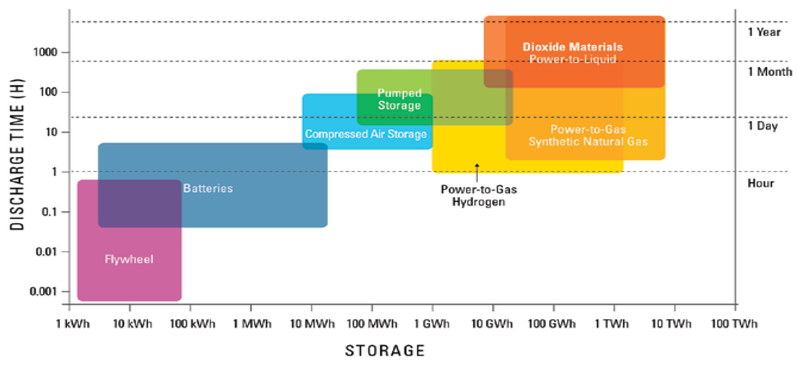
Route to large volume chemicals

Add molecules to increase capacity, similar to electochemical chlor-alkali systems.

Can Also be an Energy Storage Method



Useful For Long-Term Storage Of Energy



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