The West Virginia Energy Summit: Advancing Domestic Resources In an Era of Carbon Challenges

How Governments Can Help Industry Develop & Adopt Clean Coal Technologies to Capture and Store CO_2

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www.coal.org

There Are 2 Methods to Capture or Reduce CO_2 Emissions from Coal Use

- **CO_2 Emissions Reductions thru Efficiency:**
  - Can be achieved by **increasing the efficiency** of a plant so less coal is used to produce the same amount of electrical output
  - Higher Efficiency = Lower Emissions
- **CO_2 Emissions Reductions thru Carbon Capture and Storage (CCS):**
  - Can be achieved in the future by developing **CO_2 capture** technology to retrofit existing units or integrate into new units

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CURC's two-part program to develop & use technology to address CO_2

1. Longer term research, development and demonstration (RD&D) program

2. Near term CO_2 project (focuses on technology installation NOW)

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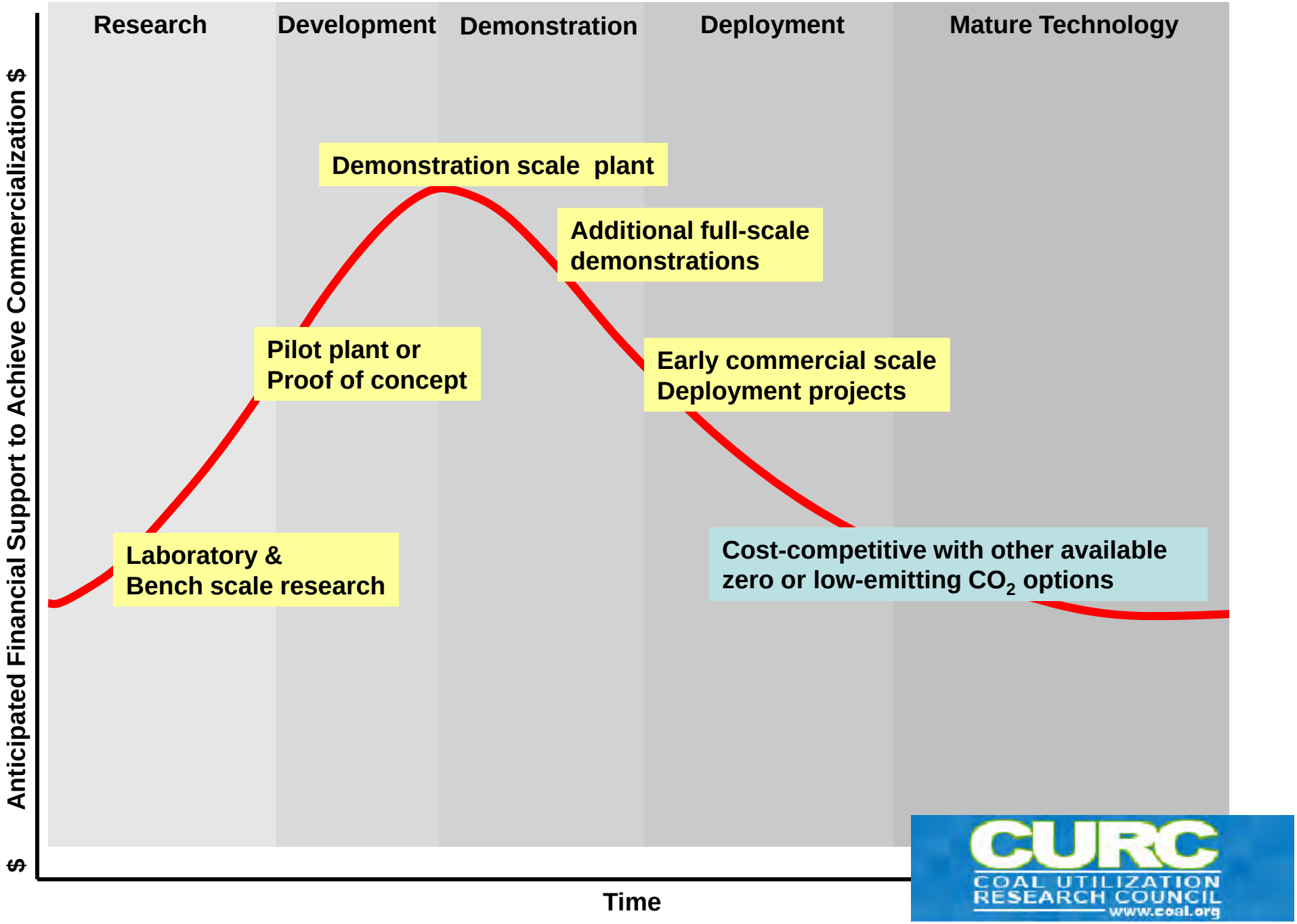
Typical development cycle of large scale, capital intensive coal systems



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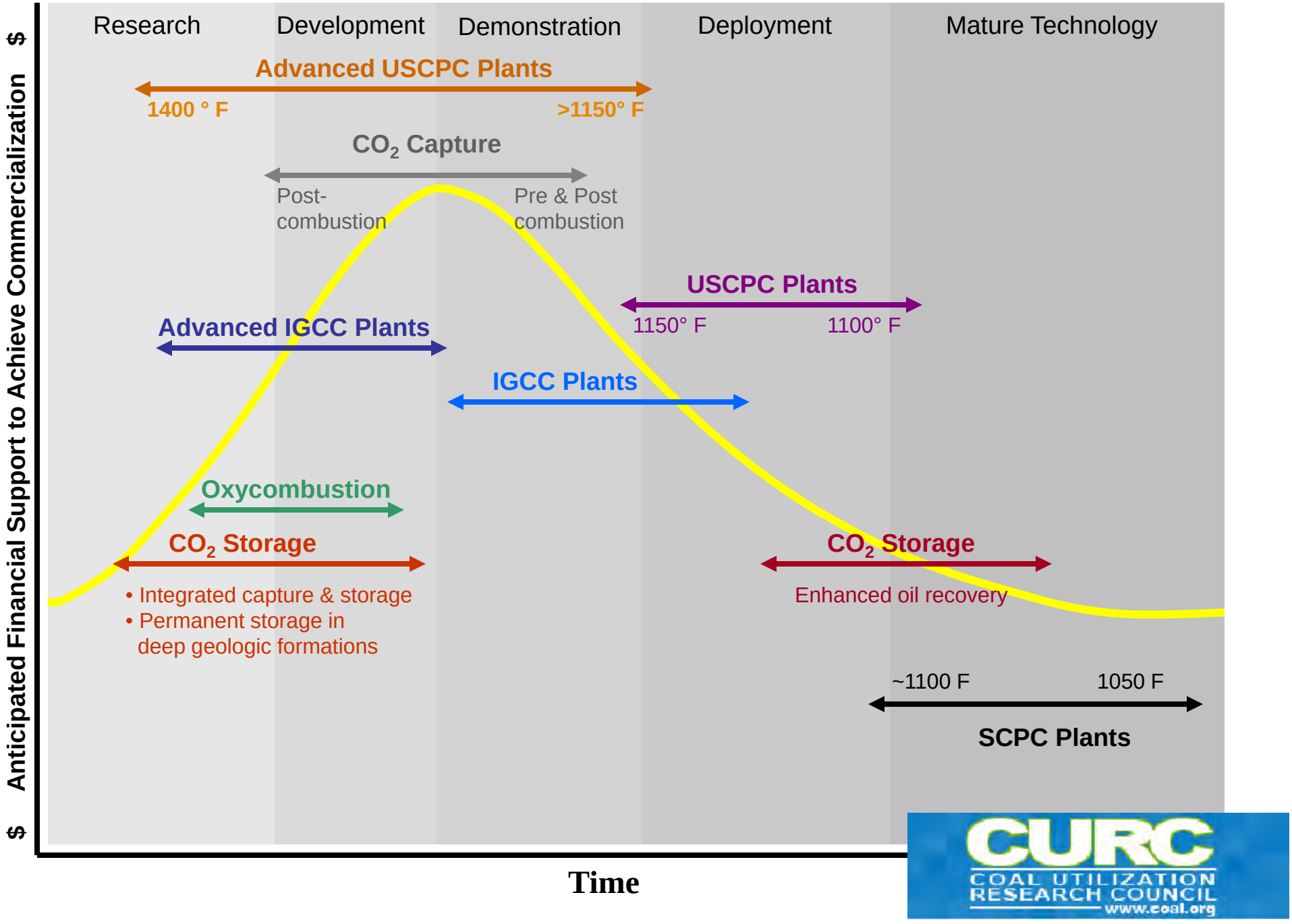
Approximate level of development of various advanced coal technologies & CO_2 capture and storage



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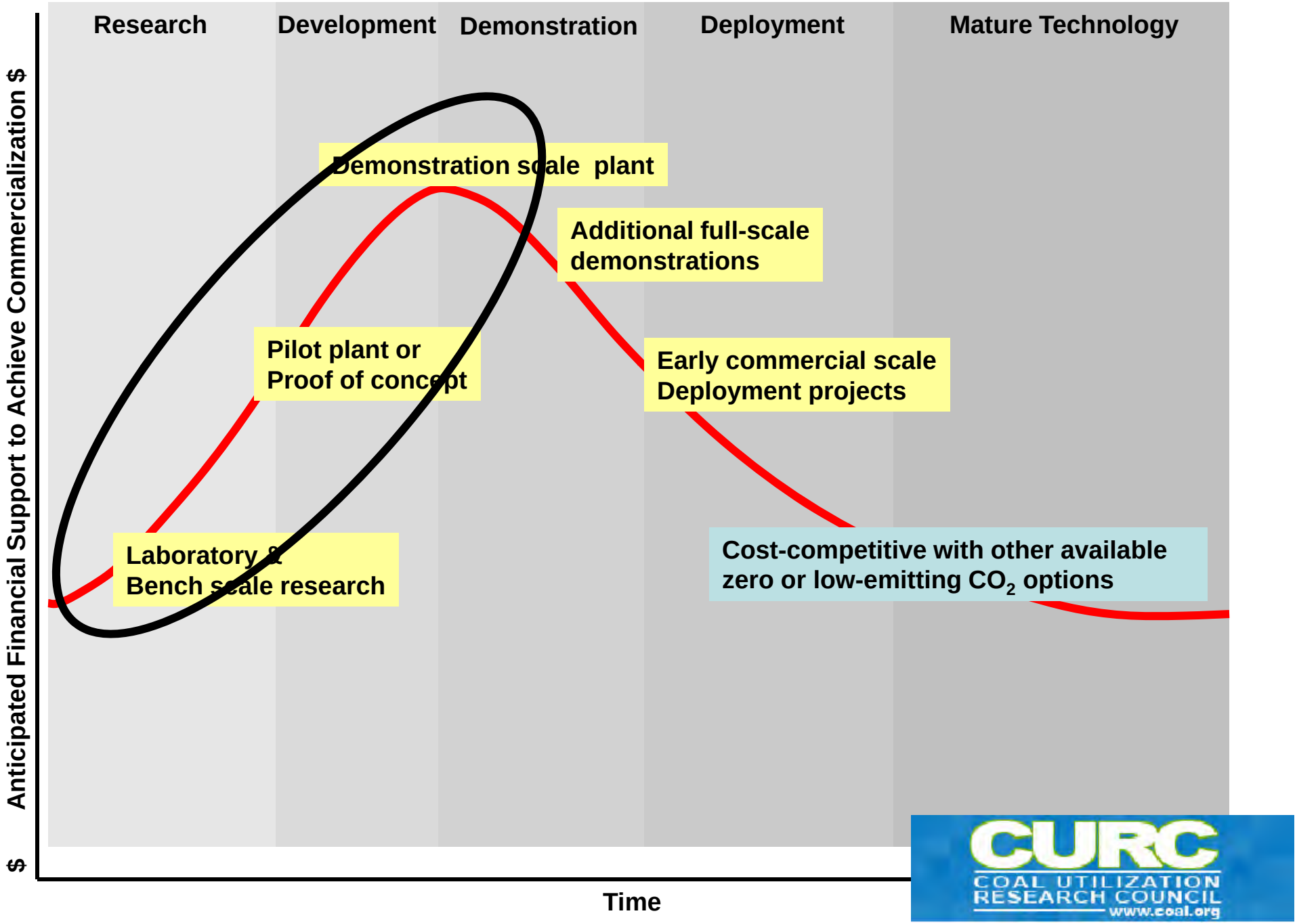

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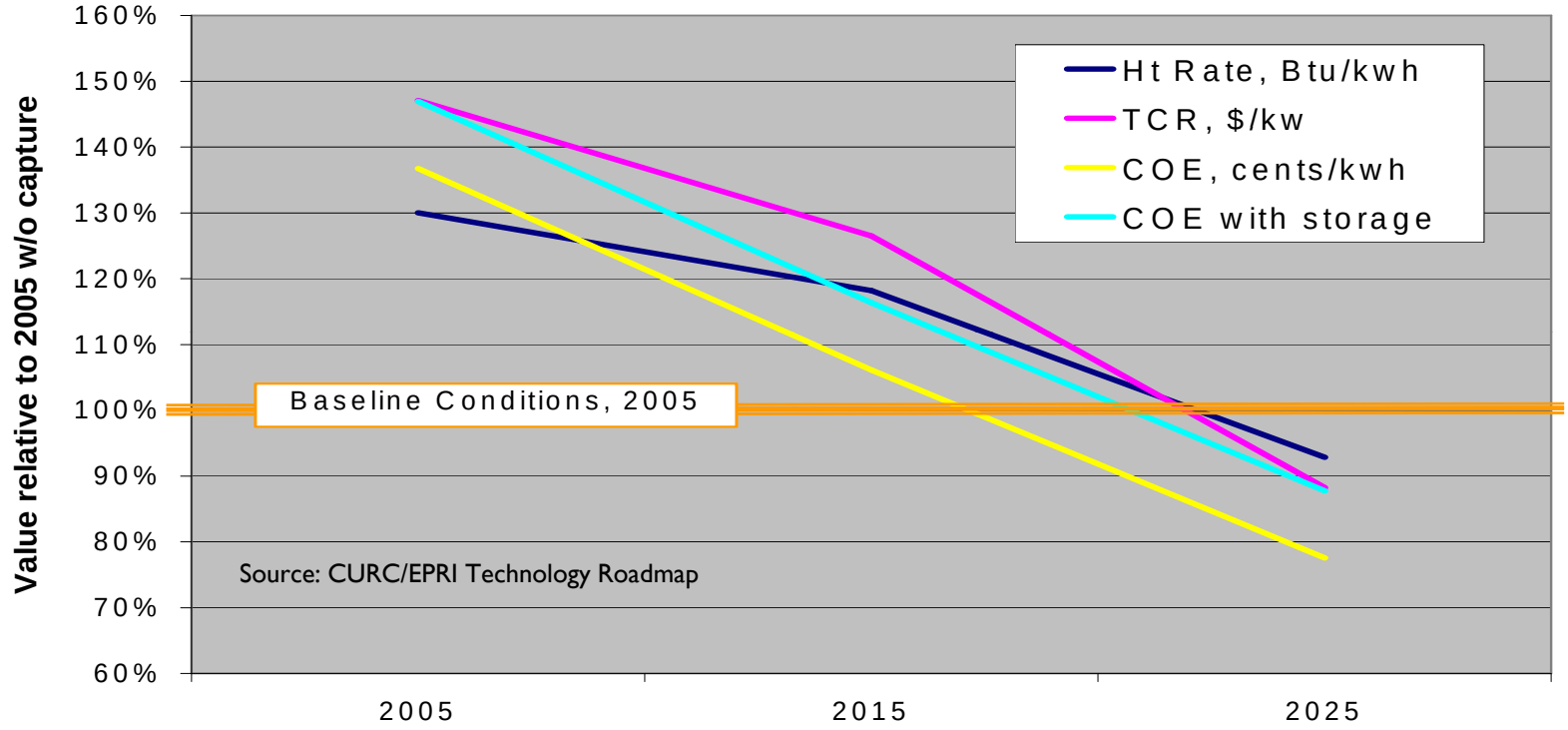
With RD&D, today's costly CO_2 capture systems can become cost-competitive



Necessary Technologies

IGCC

-Improved refractory
-Demonstrated C storage
-Ion Transport Membrane (O_2)
-Hydrogen turbine

-Warm gas cleanup
-Membrane CO_2 separation
-Multi-pollutant disposal

PC

-Advanced steel alloys
-Advanced Sorbents for CO_2 capture (e.g., chilled ammonia)
-Oxy-Firing

-Advanced sorbents
-Chemical looping

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Summary of Long Term RD&D Recommendations

1. Achieve emission reductions an “order of magnitude greater” than today’s best technology – SO_2, NO_x, PM, Hg and CO_2
2. Energy conversion efficiency at coal fueled power plants of ~50% (today 35%)
3. Advanced coal utilization power plants capable of capturing 90+% CO_2
4. Long-term, safe and permanent storage of CO_2
5. Affordable electricity

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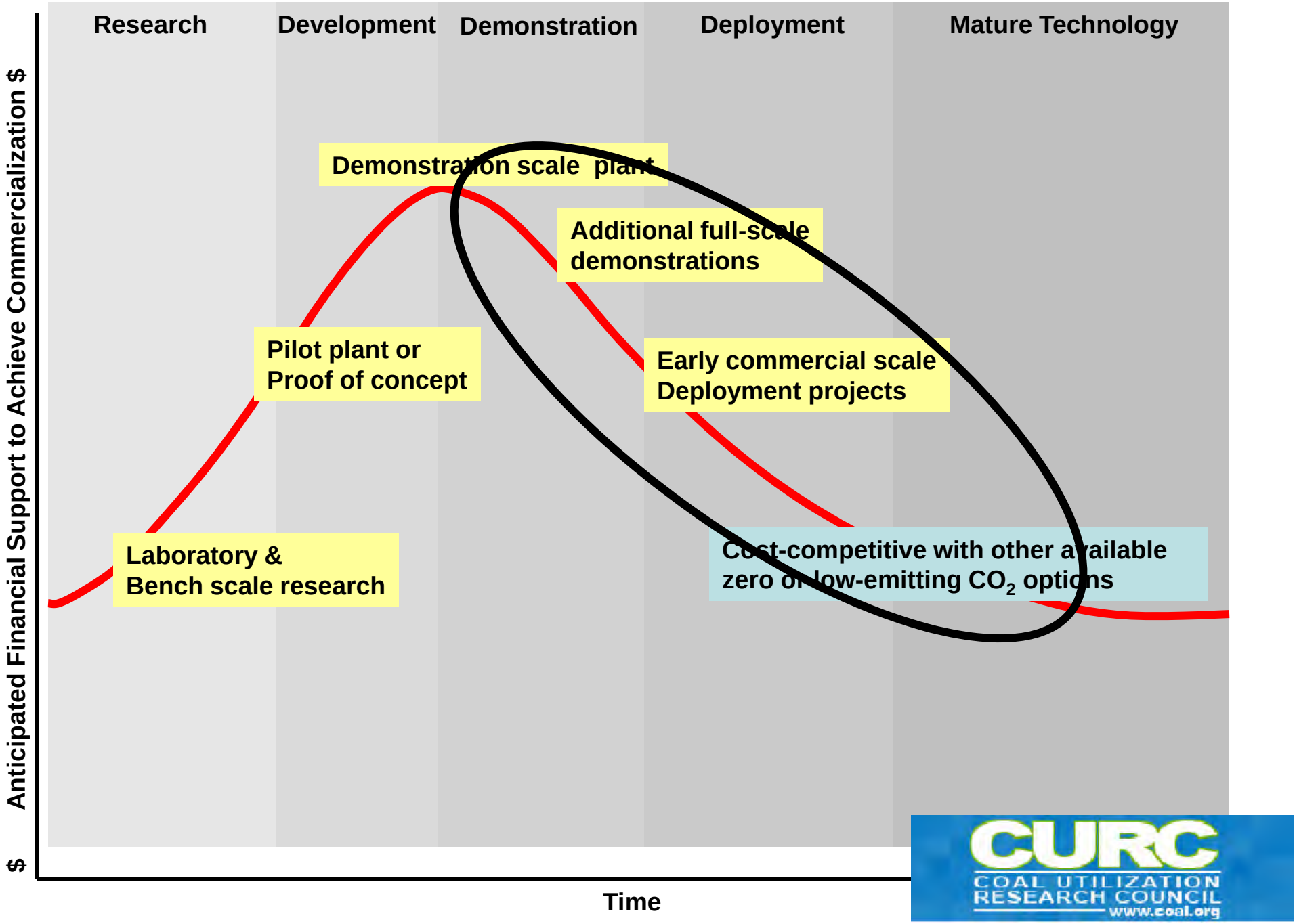

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Summary of Near Term Recommendations

1. Increase the efficiency of existing units and new advanced clean coal units
2. Support “early adopters” who plan to demonstrate carbon capture & storage (CCS) projects
3. Adopt legislation to create a predictable framework for CO_2 long term transport & storage (questions about risk & liability)

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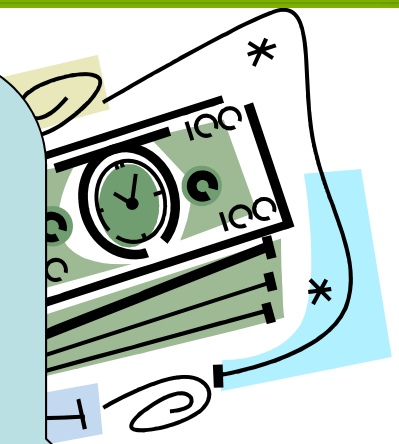
What's needed to achieve the two-part plan?



Total gov't funding required -- ~$24 billion:

$17 billion for long-term RD&D program
$10 billion federal government
$ 7 billion private sector & other

$50 to 70 billion for near-term CO_2 projects
$14 billion federal tax incentives
$36 to 56 billion from industry

How muc... do we n...	...money ...eded?
Long-term... Now thru 2025	DOE and/or other	...g-term RD&D ~$17 B
Near-term CO_2 Now thru 2023	Near-term CO_2 Industry projects with tax incentives	Near-term CO_2 ~$14 B (gov't only)

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Right Now: We are WAY in Front of our Skis