The Potential for Commercial Wind Power Production in the State of Missouri

August 6, 2008
Missouri

KEMKER & ASSOCIATES

Special Note

- This presentation is not a solicitation for funds for the purpose of building a wind power facility

- This presentation is, however, an update regarding an ‘ongoing’ wind power feasibility study being conducted within the State of Missouri

Proposed Outline of Today's Discussion

- Primer on Wind Energy
- Summary Comments
- General Feasibility
- Questions

Primer on Wind Energy

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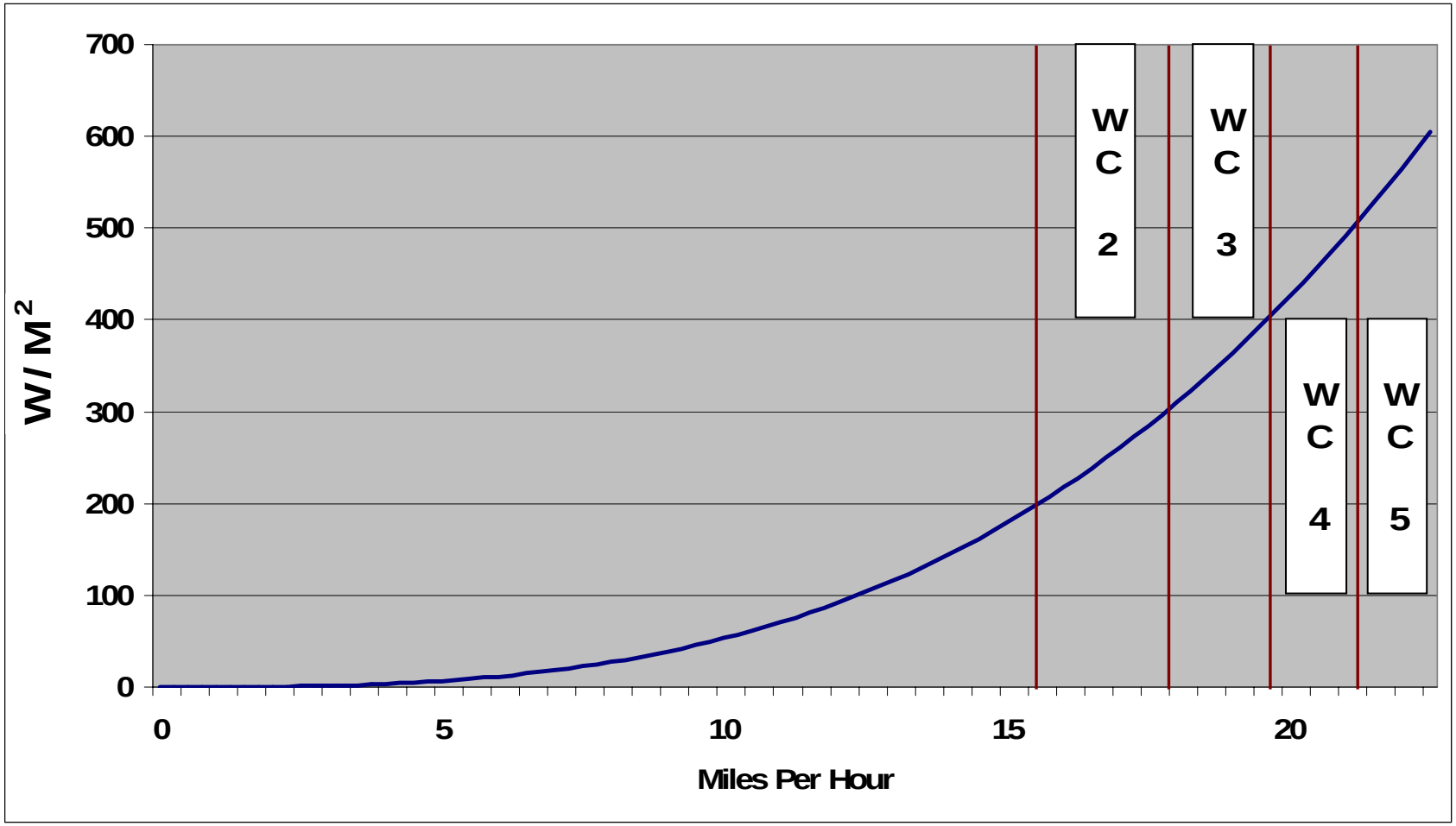
A wind resource is categorized in terms of its value...value known as "Wind Class" (wind energy density)

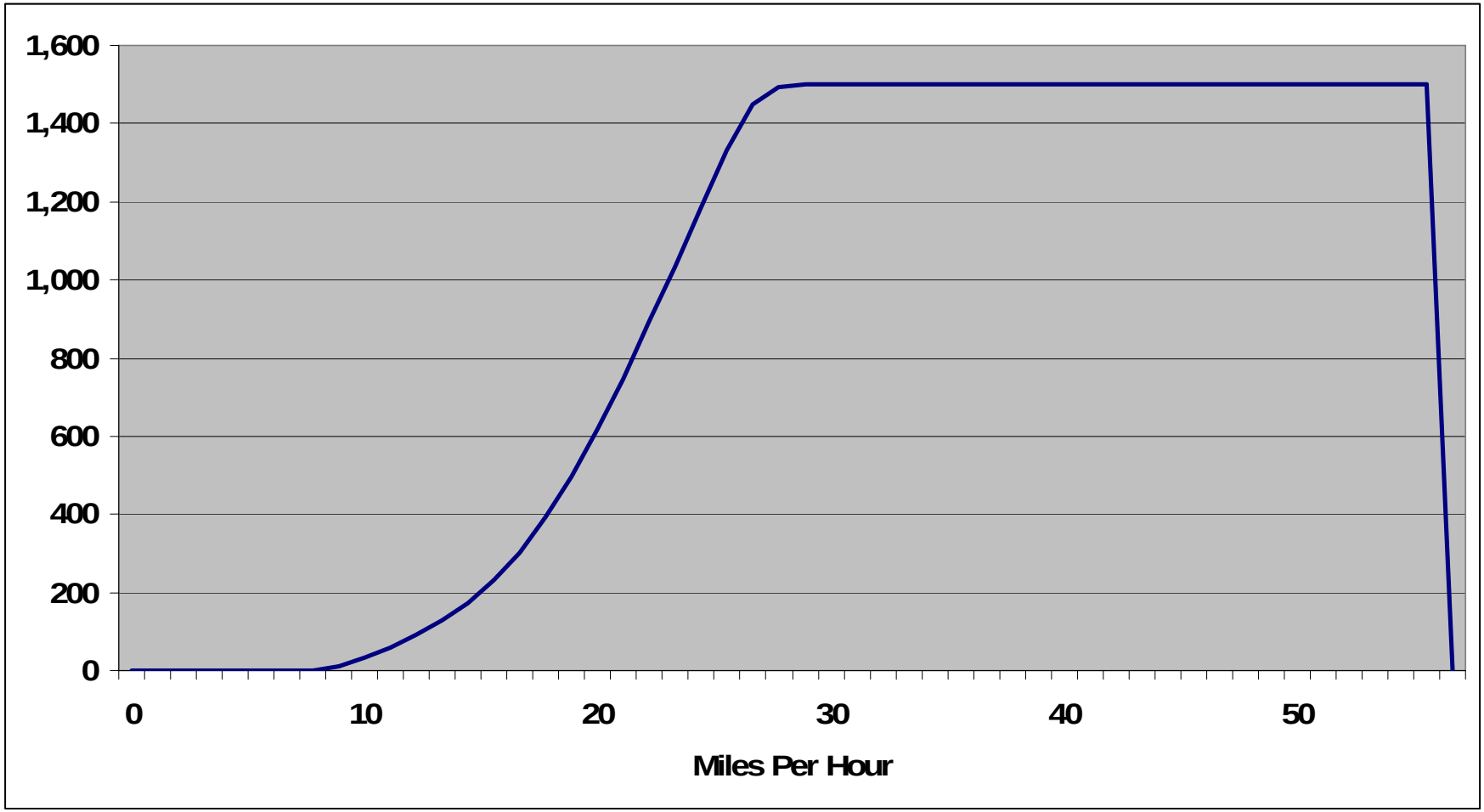
Primer on Wind Energy



Modern wind turbine output, of course, also varies as a function of wind power density (and thus wind speed)...

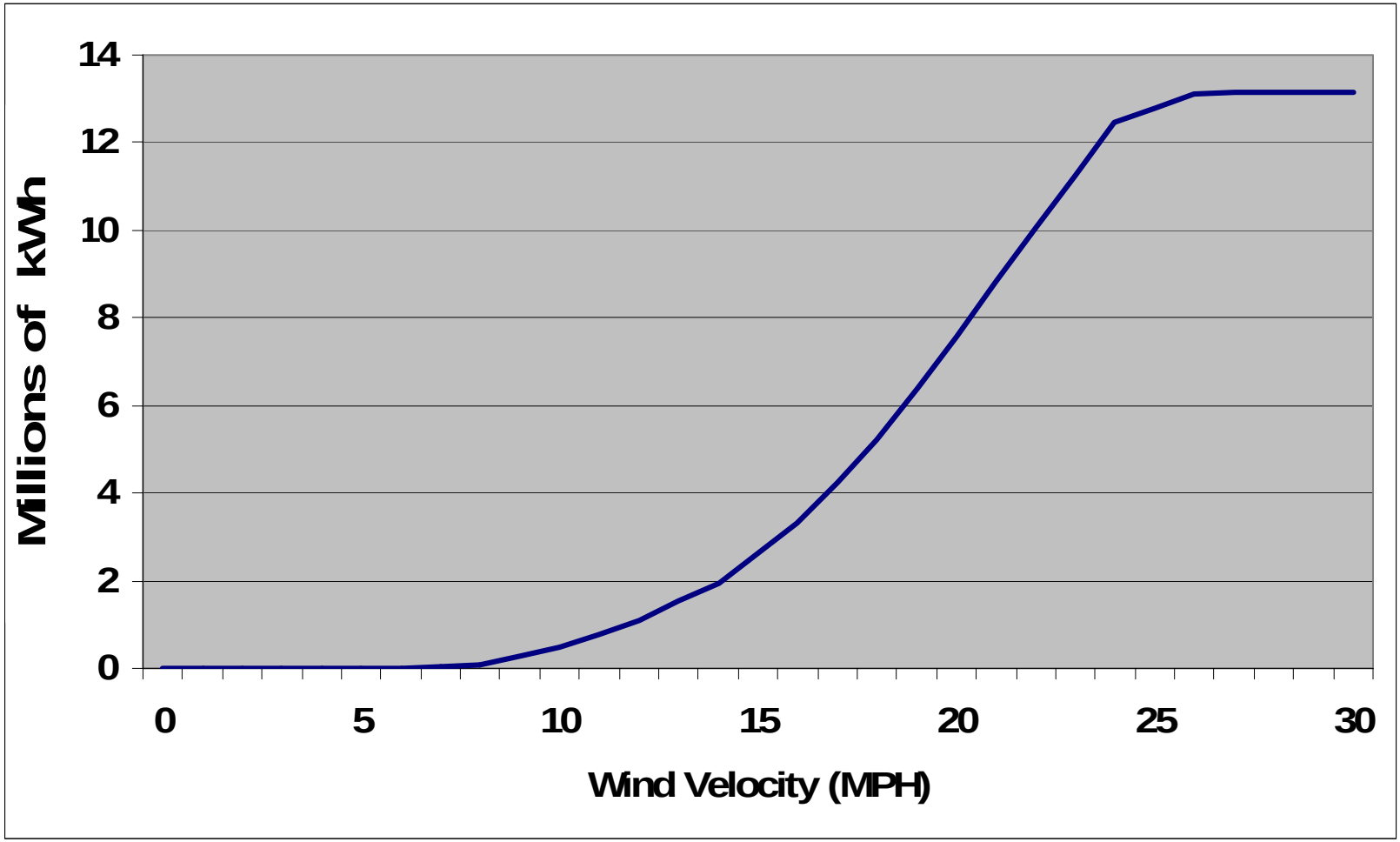
Primer on Wind Energy

Company X 1.5 MW Wind Turbine



Importantly, this turbine can produce – at a maximum – approximately 13 million kWh of electrical energy per year...

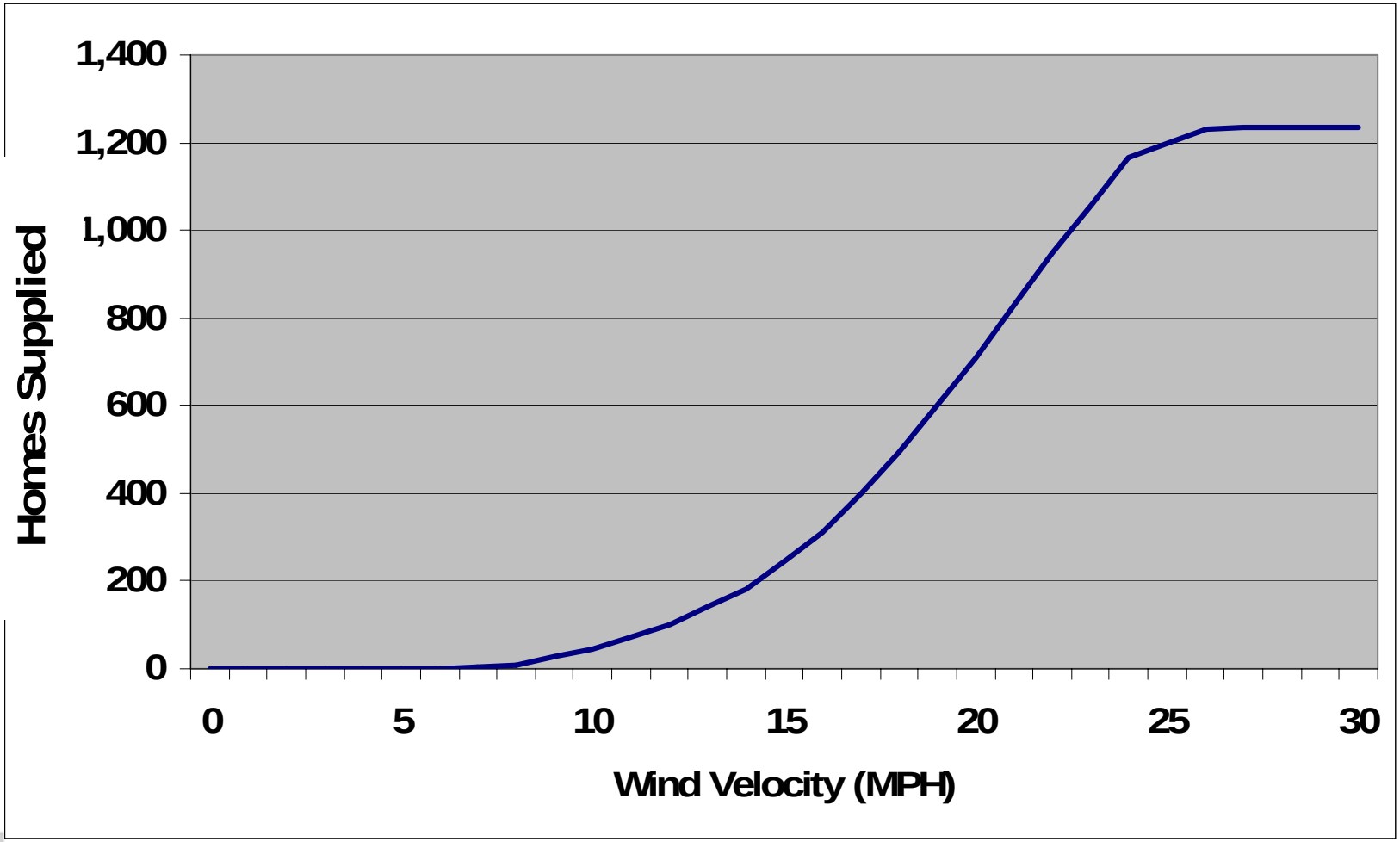
Company X 1.5 MW Wind Turbine



...and this could provide electricity for as many as 1,200 homes per year

Primer on Wind Energy

Company X 1.5 MW Wind Turbine



Revenue generated from a single turbine could be substantial ($000)

Primer on Wind Energy

Company X 1.5 MW Wind Turbine

Wind Velocity (MPH)	Revenue per kWh (¢ / kWh)									
	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
10	5	10	15	19	24	29	34	39	44	48
15	26	53	79	105	131	158	184	210	237	263
20	76	151	227	302	378	453	529	605	680	756
25	128	256	384	511	639	767	895	1,023	1,151	1,279
30	131	263	394	526	657	789	920	1,052	1,183	1,315

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Summary Comments

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There is reason for optimism

Summary Comments

- There is more wind ‘aloft’ in parts of Missouri – at commercial wind generation heights – than is widely believed...and this wind resource is located across a ‘wide area’

- This wind is likely sufficient to support commercial wind generation opportunities...especially at heights 100 meters AGL (Above Ground Level) and higher. This contention is not speculative but rather suggested by wind velocity data and formal economic analysis

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...and, we have arrived at these conclusions based on recently completed work

Summary Comments

Task I	Task II	Task III	Task IV
Understand our Wind Resources	*Identify the Potential Locations*	*Develop Preliminary Economics*	*Determine Specific Project Feasibility*
• National Weather Service • Missouri Anemometer Loan Program • Academic (UM / UND) • Project Data Collection	• Determine / Rank Order Locations • Determine proximity to power lines • Determine best locations	• Build Economic Model • Establish Feasibility	• Finalize Economics • Determine Specific Project Feasibility • Build Prospectus

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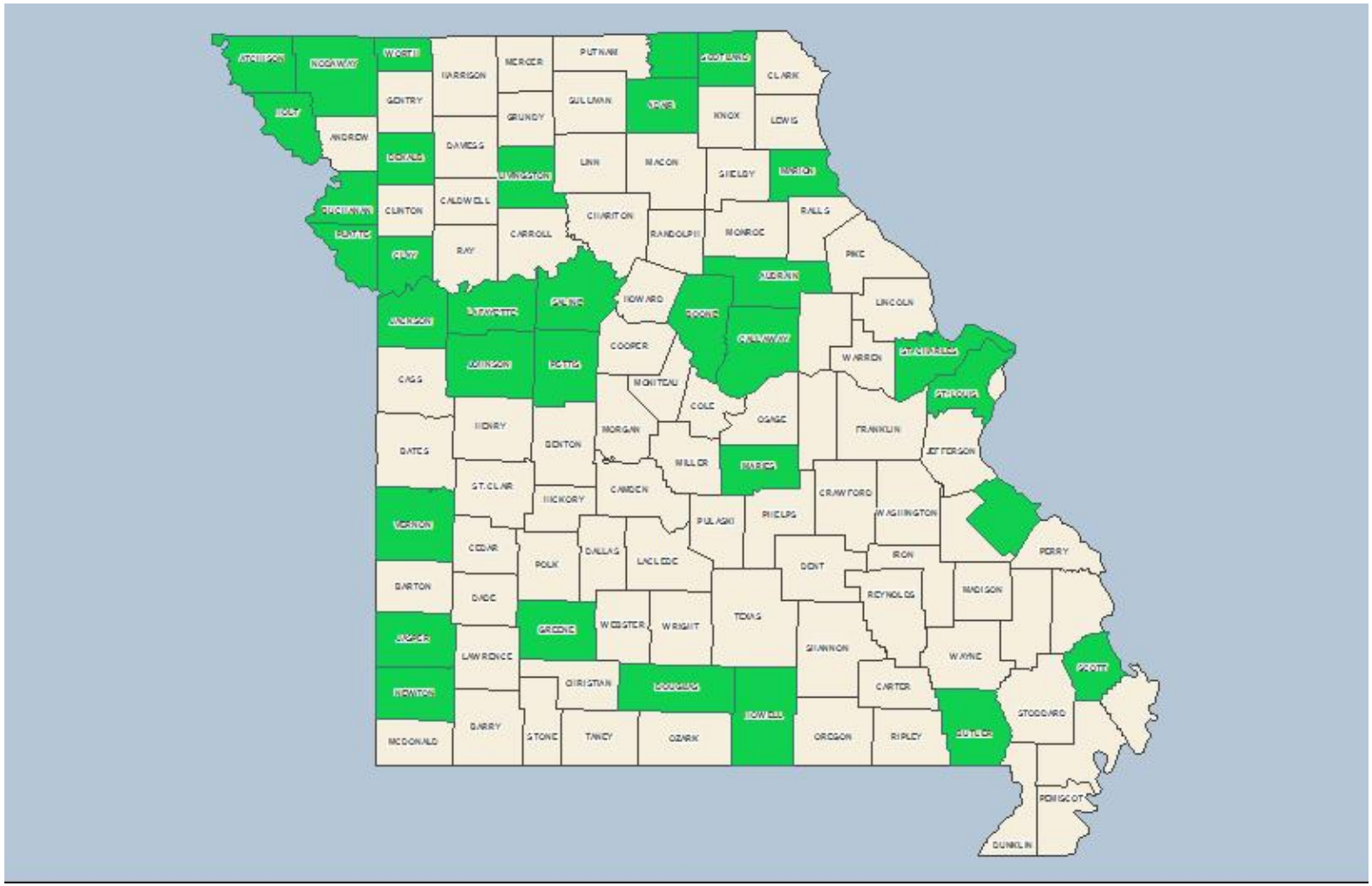
As a quick sidebar, note that locations in many counties were reviewed

Summary Comments



General Feasibility

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Building and operating a wind energy production facility in Missouri is economically feasible...a scenario is displayed

General Feasibility

- Pro Forma Basics / Financial Items
  - Location – north of Interstate 70...with actual wind velocity profile from that location
  - Year of Project Initiation – 2009
  - Year of Project Operation – 2011
  - Weighted Average Cost of Capital (WACC) – 6%
  - Tax Rate – 33%
  - Production Tax Credit – 1.9¢ per kWh
  - Fixed Capital Depreciation – Straight Line – 25 Years

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Inputs

General Feasibility

- Pro Forma Basics...CONTINUED
  - Capitalized Interest Depreciation – Straight Line – 25 Years

Inputs

General Feasibility

- Capital
  - Pre-Works
  - Civil Works
  - Basic Equipment
  - Control Equipment
  - Miscellaneous

Inputs

General Feasibility

- Capital...CONTINUED
  - Pre-Works
    - Wind resource analysis / assessment / prospectus preparation / sundry legal work
    - Permitting
    - Surveying
    - Construction of Service Roads

Inputs

General Feasibility

- Capital...CONTINUED
  - Civil Works
    - Construction of wind turbine foundations
    - Construction of sub-station foundations, etc.

Inputs

General Feasibility

- Capital...CONTINUED
  - Basic Equipment
    - Wind Turbine Generators (WTGs)
      - Manufacturer – Not Disclosed
      - Model – 2+ MW
      - Number – 50...100+ MW of installed capacity
    - Blades – one of several possible purveyors
    - Towers – one of several possible purveyors...and note that the hub height is substantially higher than 80 meters

Inputs

General Feasibility

- Capital...CONTINUED
  - Control Equipment
    - Wind Speed / Direction Sensors
    - Power Collection System
    - Operations & Maintenance Facility
    - Communication System
    - Power Measurement Equipment
  - Miscellaneous (Trucks / Office Furniture and Equipment, etc.)

Inputs

General Feasibility

- Operating Characteristics / Reliability
  - Downtime Losses – 2%
  - Icing Losses – 2%
  - Array Losses – 5%
  - Other Losses – 1%

Inputs

General Feasibility

- Operating Expenses – Variable Cash Costs
  - Maintenance
    - Unscheduled Maintenance
    - Planned Maintenance
    - Major Overhauls and Subsystem Replacement
  - Land Use
  - Transmission / Wheeling

Inputs

General Feasibility

- Operating Expenses – Selling, General, and Administrative Expenses
  - Property Taxes
  - Insurance
  - Personnel Expenses
  - Fuel
  - Legal
  - Office Supplies
  - General Administrative Expense
  - Depreciation

Inputs

General Feasibility

- Revenue
  - 7¢ per kWh...flat profile

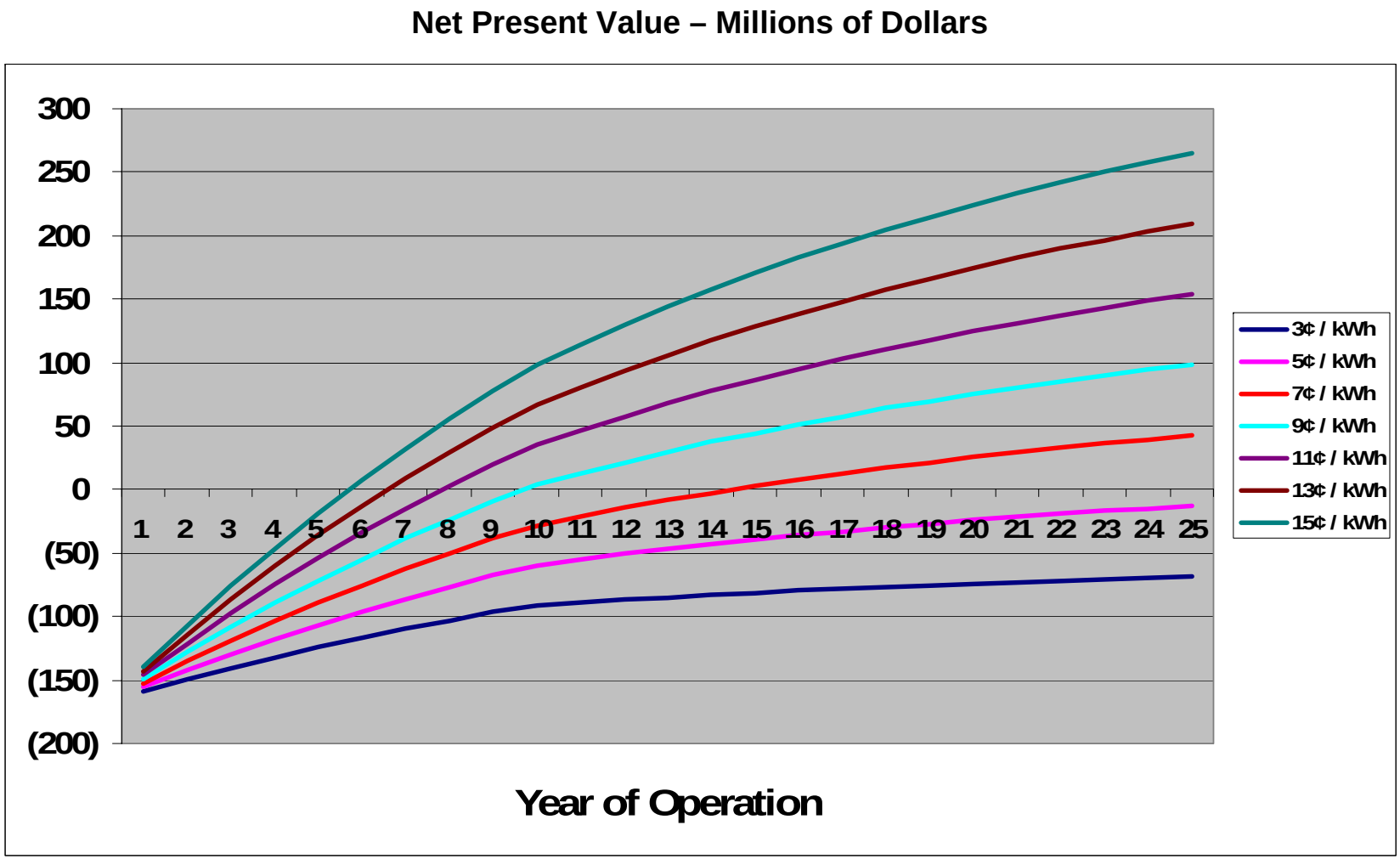
Outputs

General Feasibility

- Revenue – ~$23 million
- Operating Income – ~$8.8 million (first year)
- PAT - ~$5.9 million (first year)
- CFFO - ~$19 million (first year)
- ROCE – ~11% (first year)

NPV as a function of electricity price

General Feasibility



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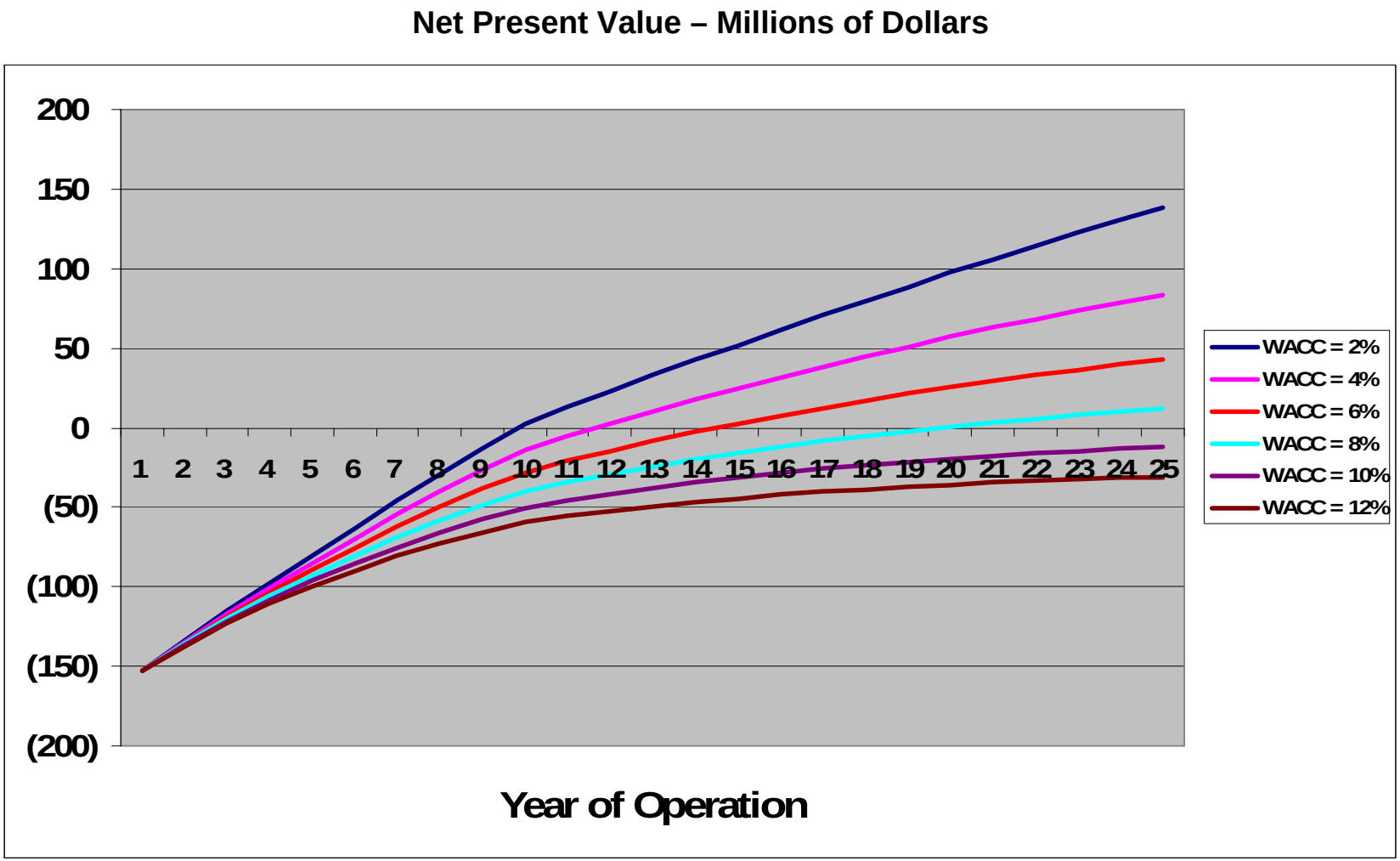
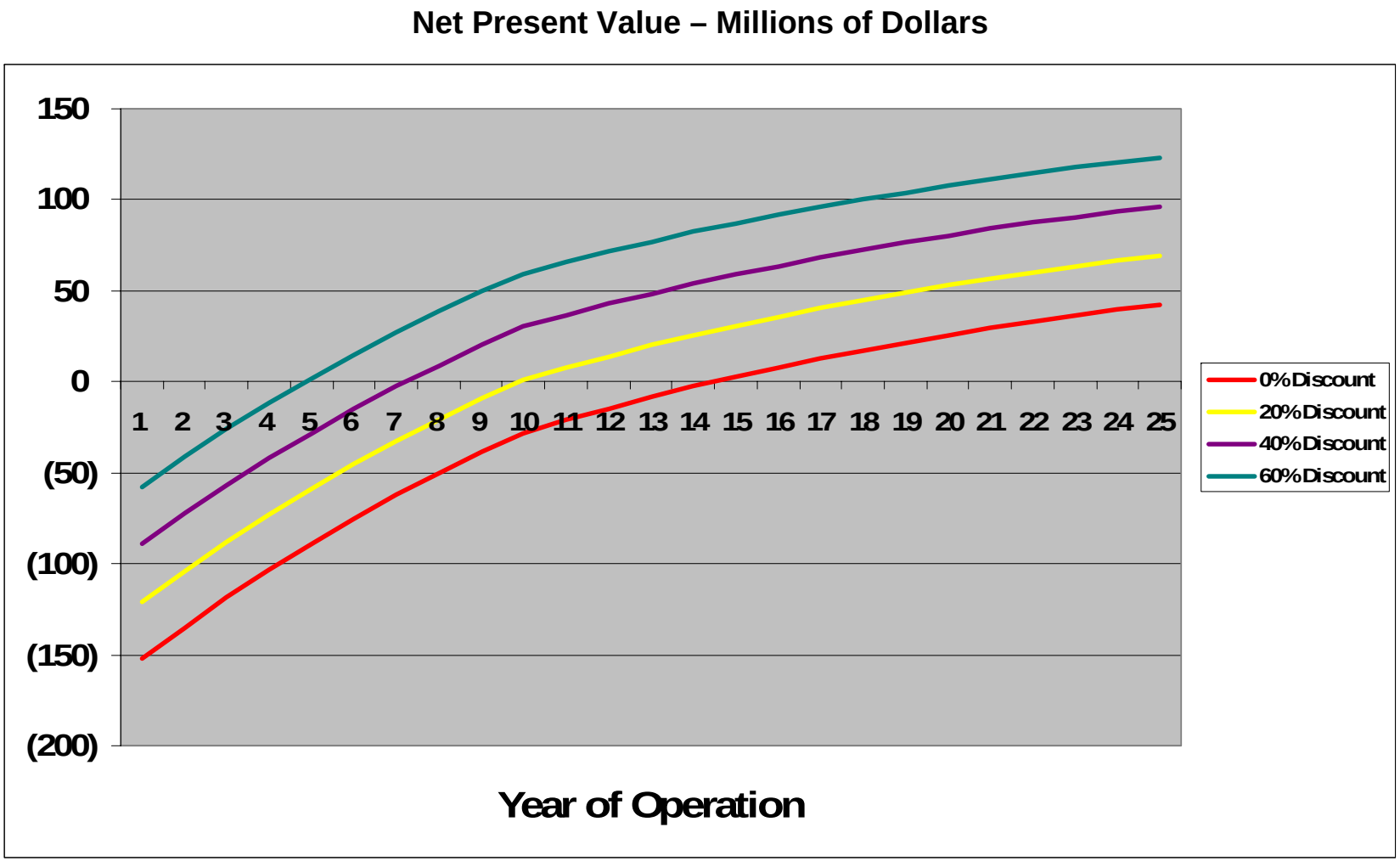
NPV as a function of the weighted average cost of capital

General Feasibility



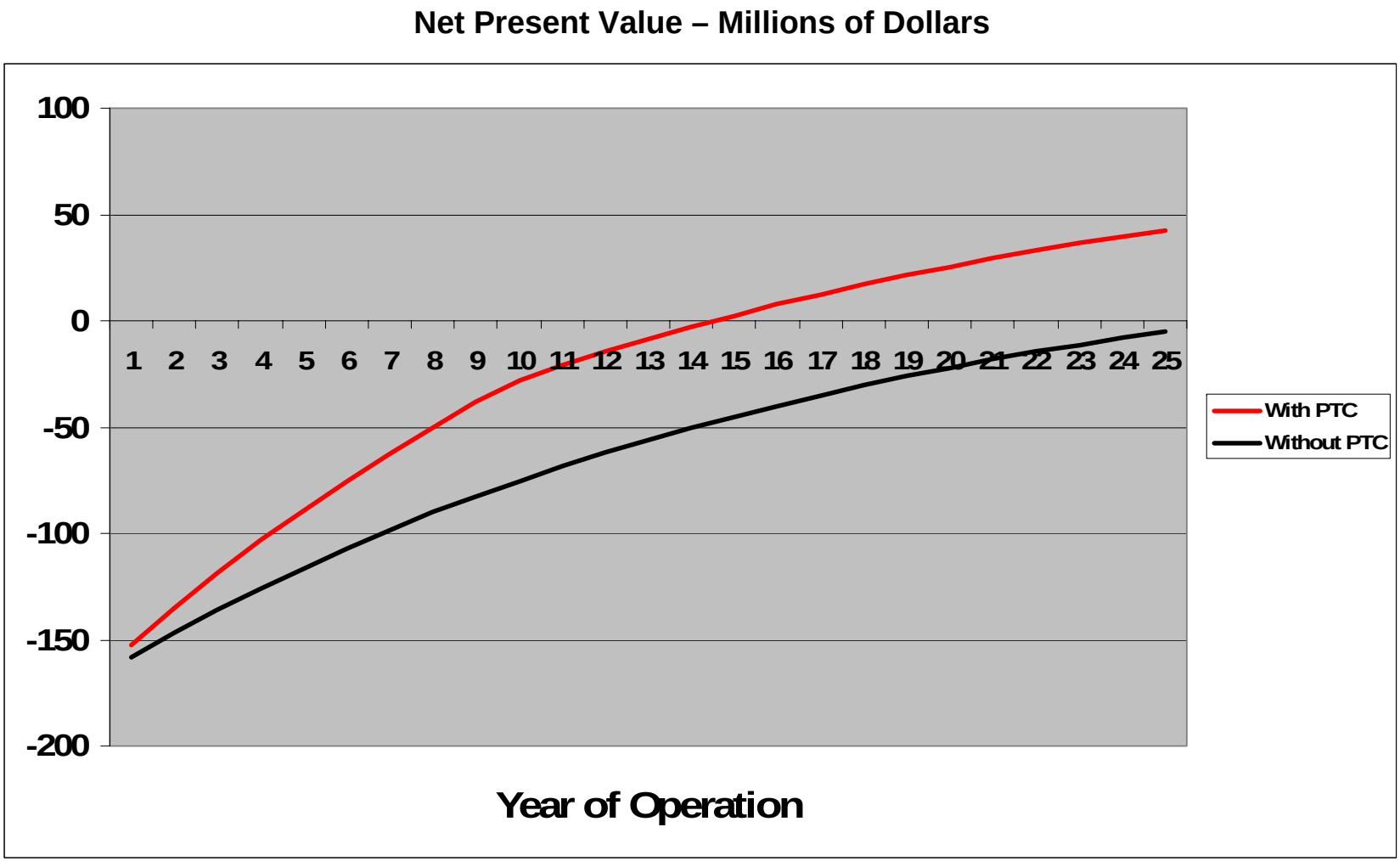
NPV as a function of the capital discount

General Feasibility



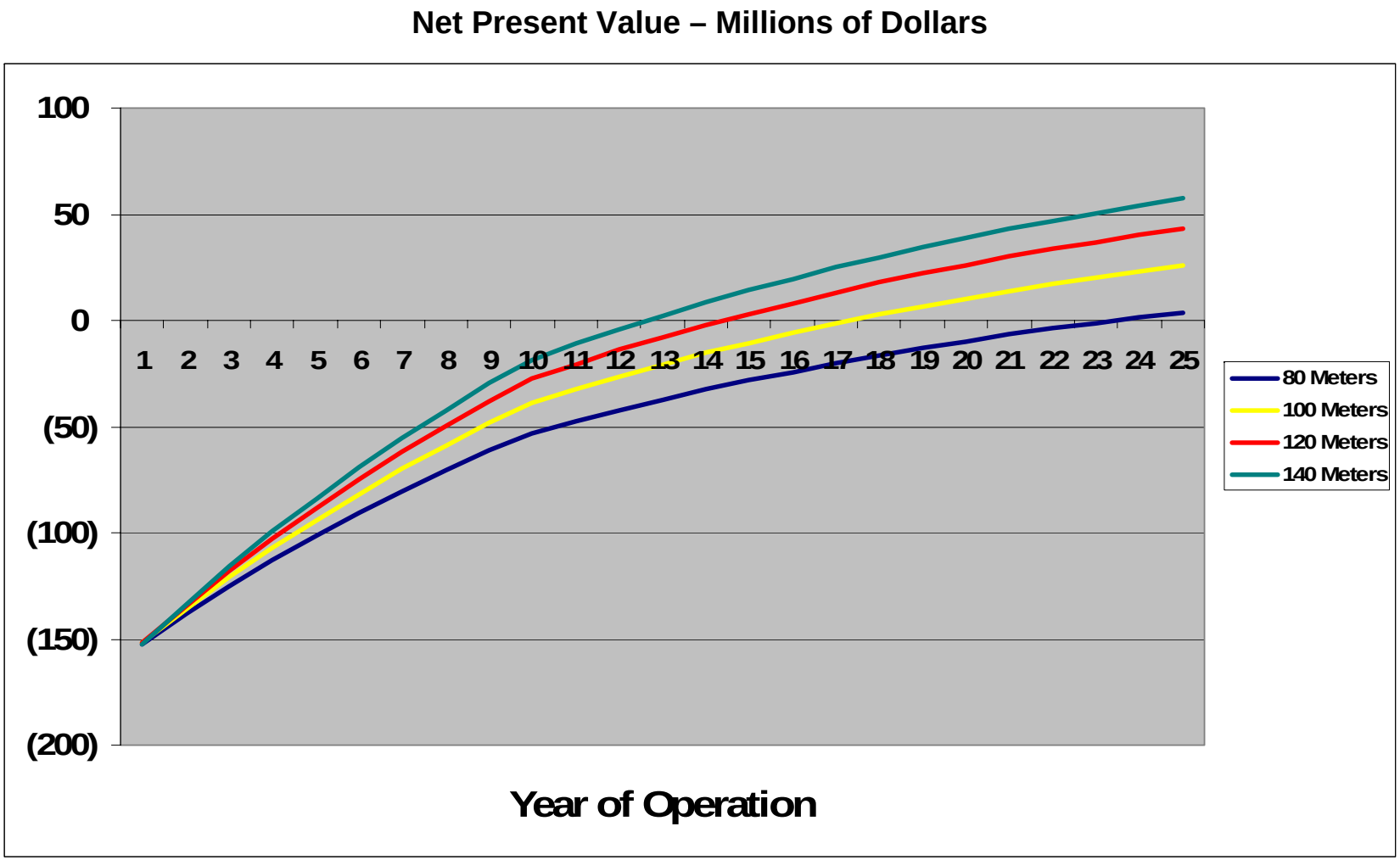
NPV as a function of the existence of the Production Tax Credit

General Feasibility



NPV as a function of height Above Ground Level

General Feasibility



Thank you for your time and attention

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