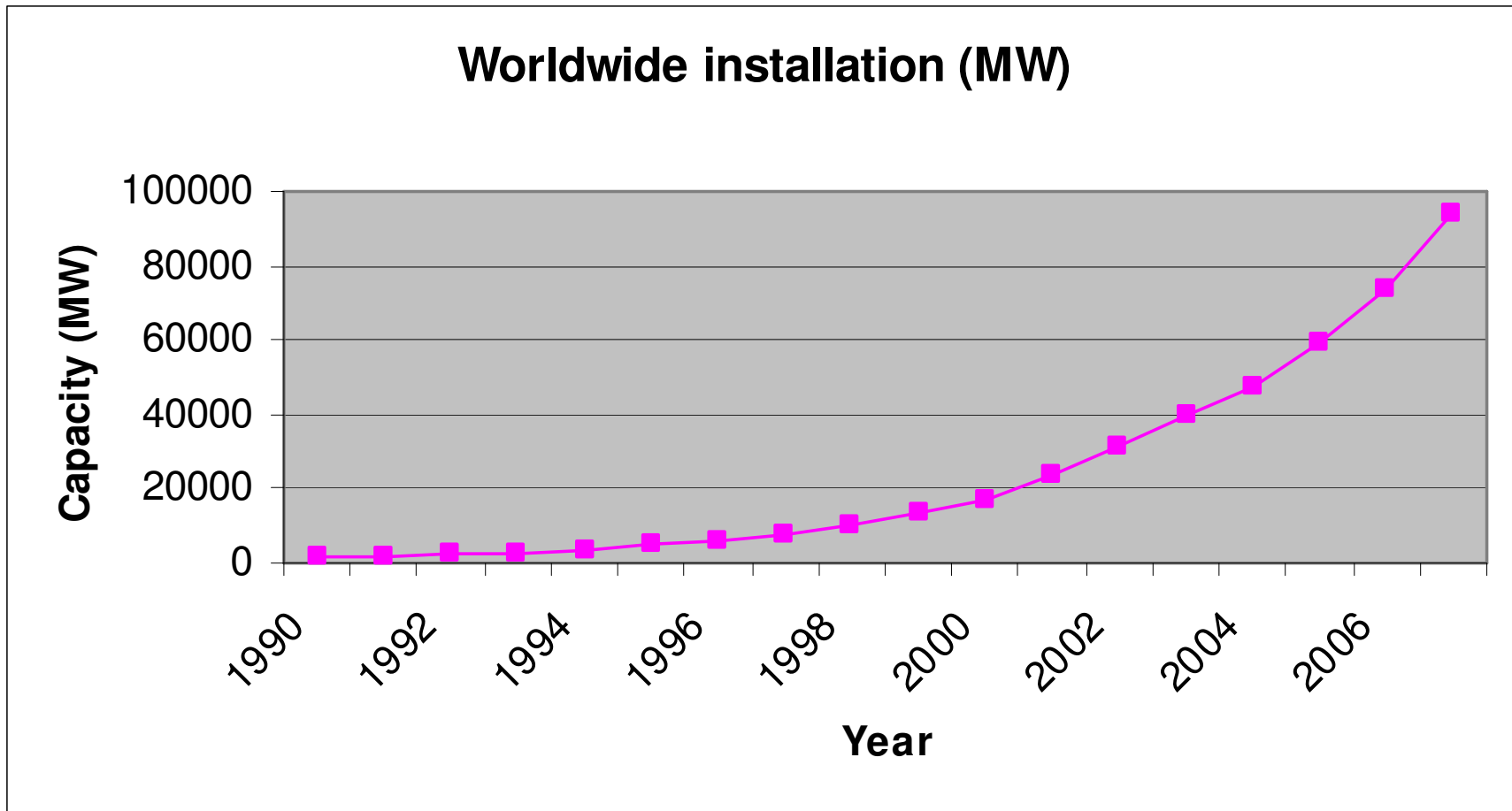


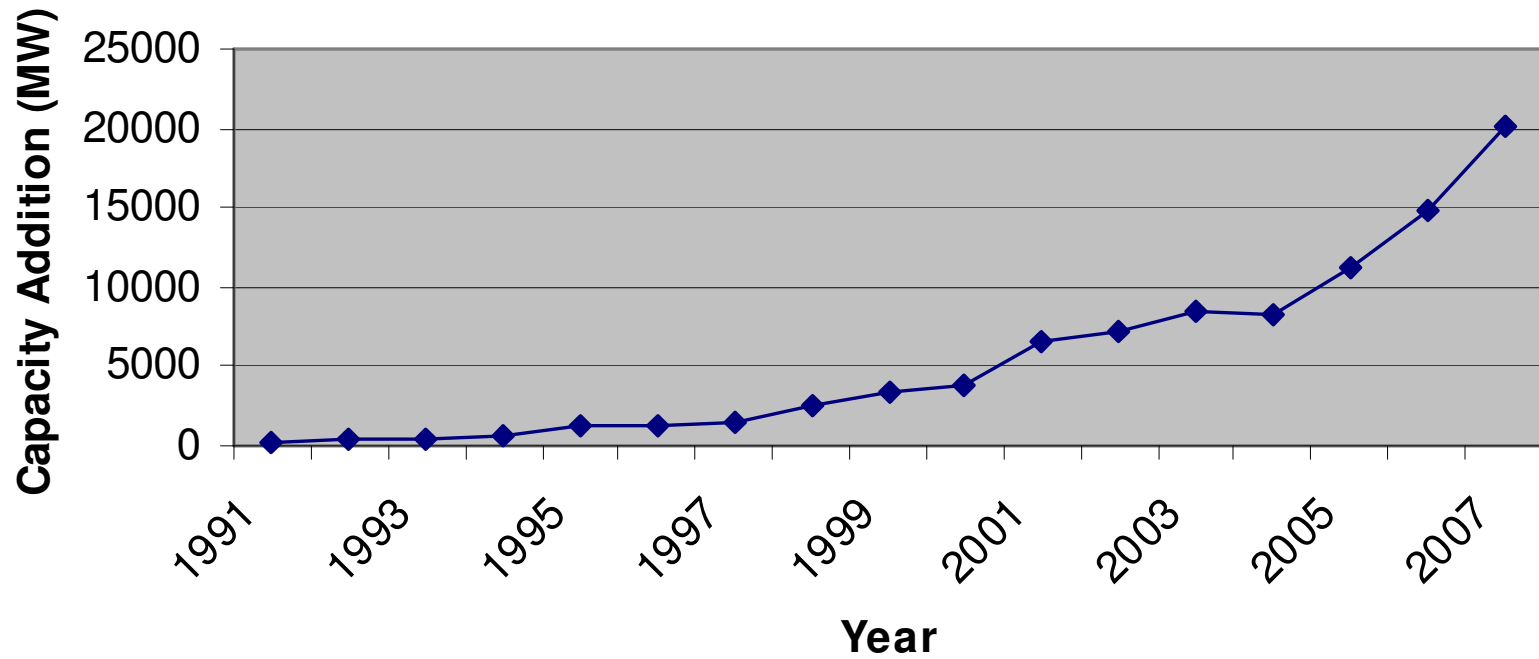
Technology Expectations

Jami Hossain

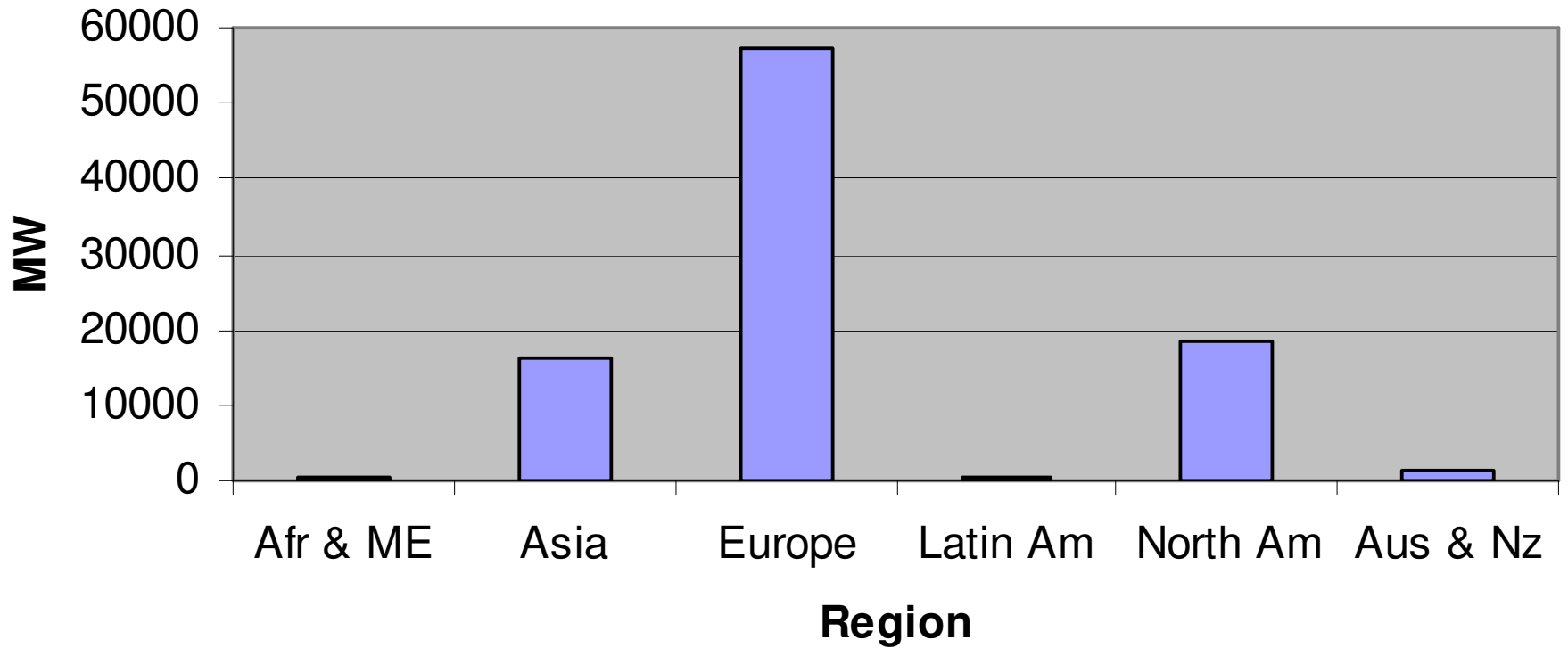
Trends



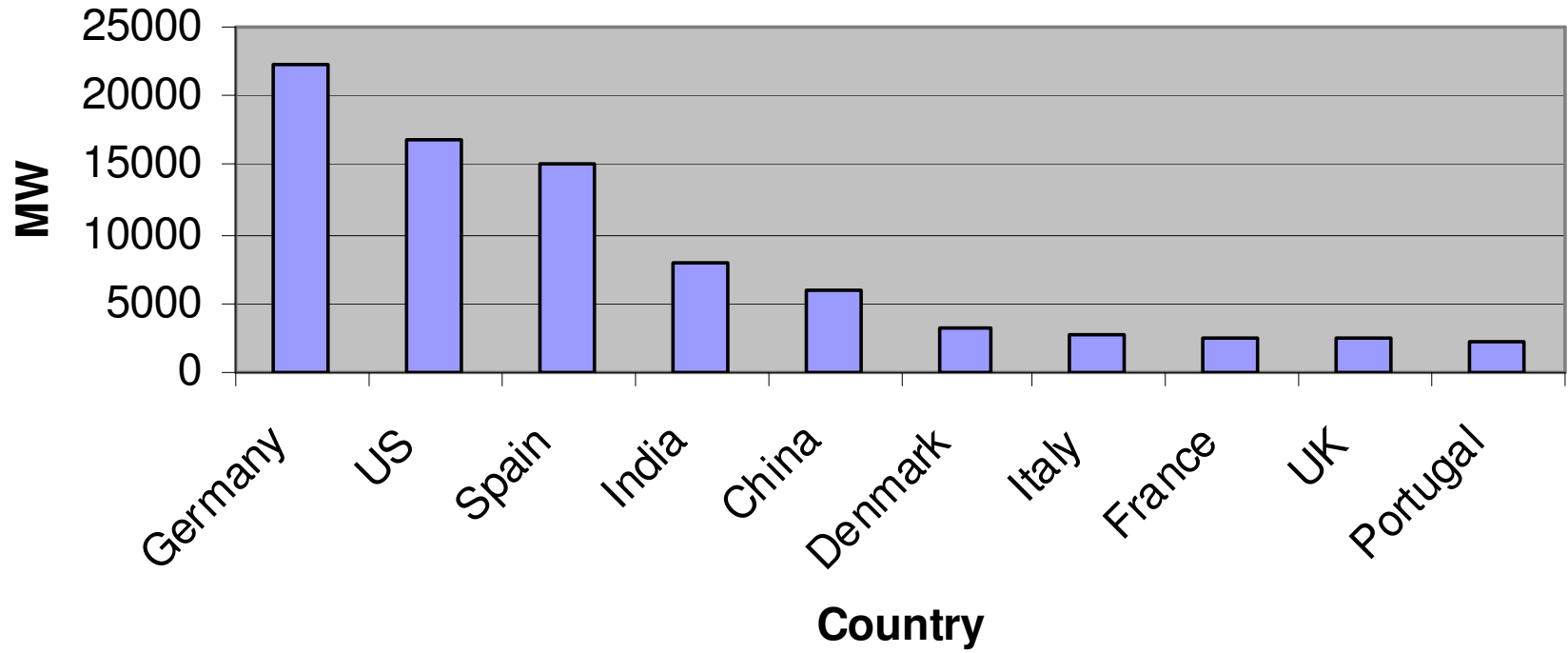
World Annual Capacity Additions (MW)



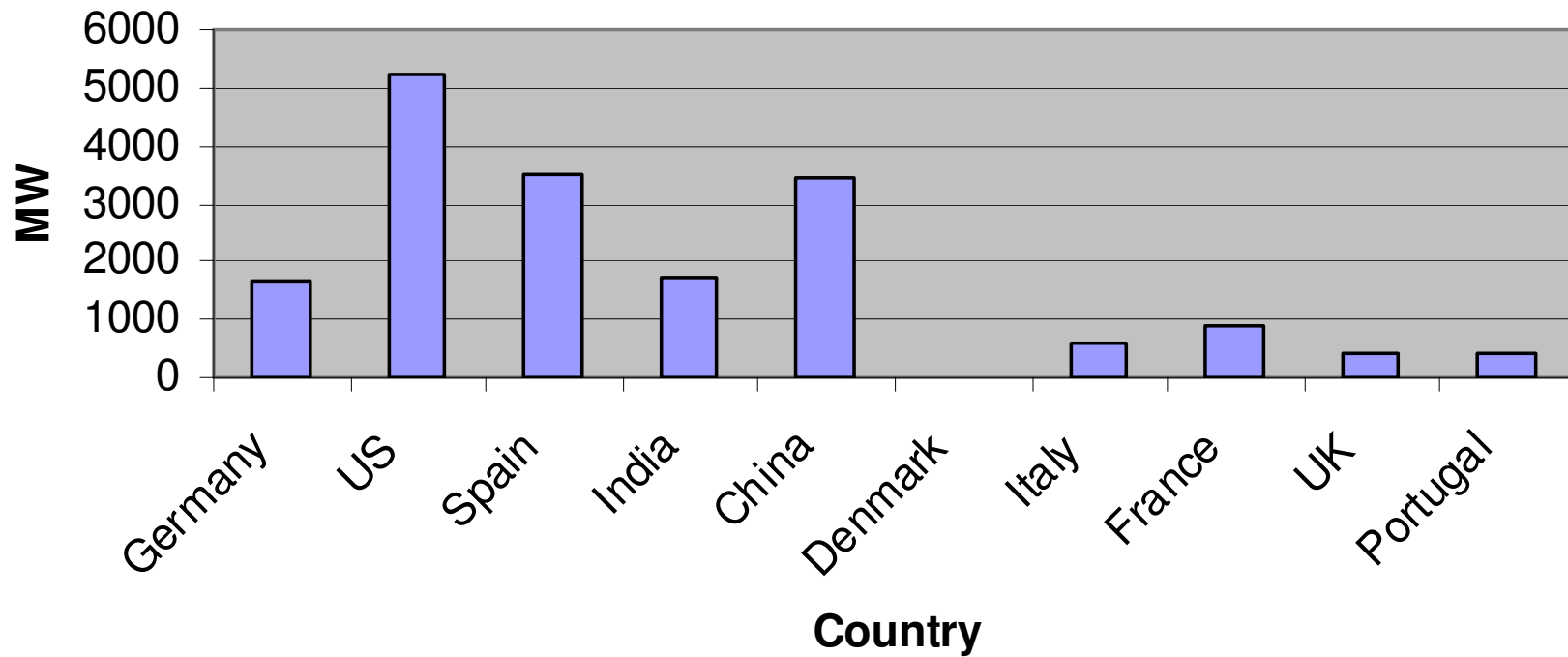
Regionwise Breakup (2007)



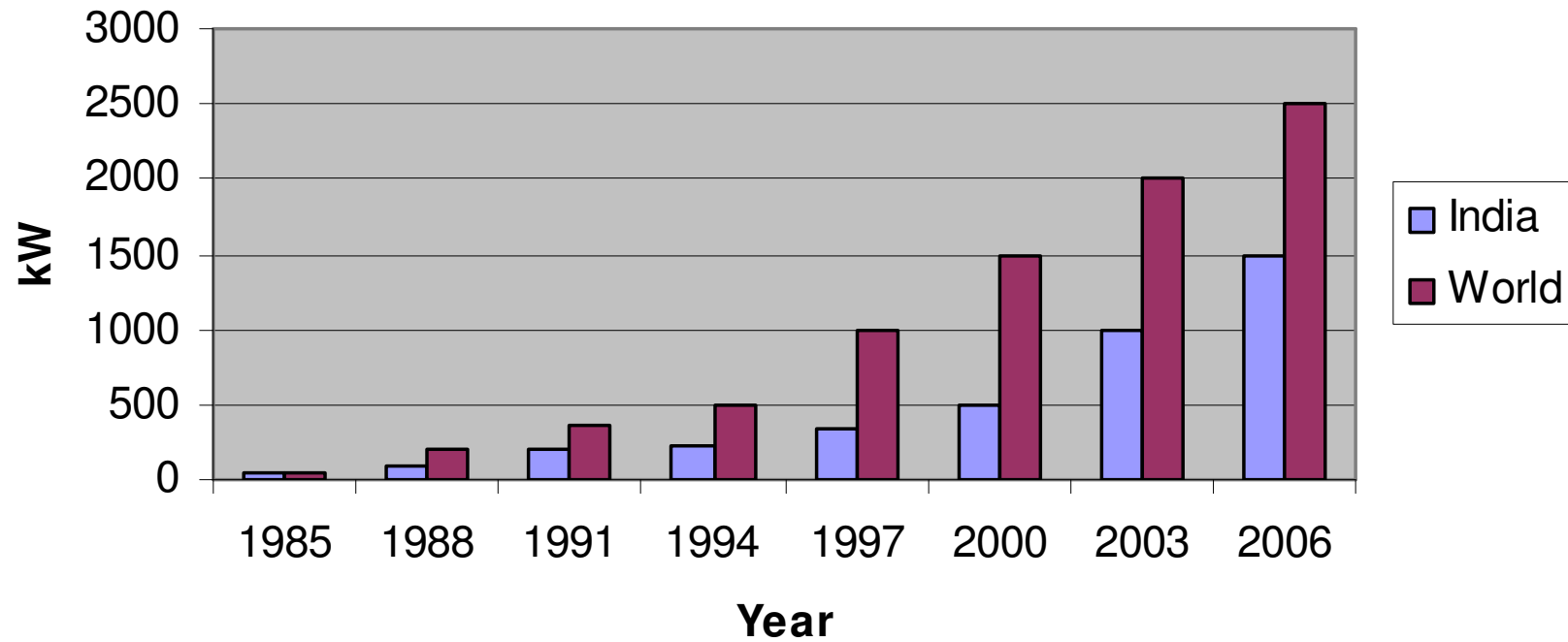
Capacity Major Countries (>2000 MW)



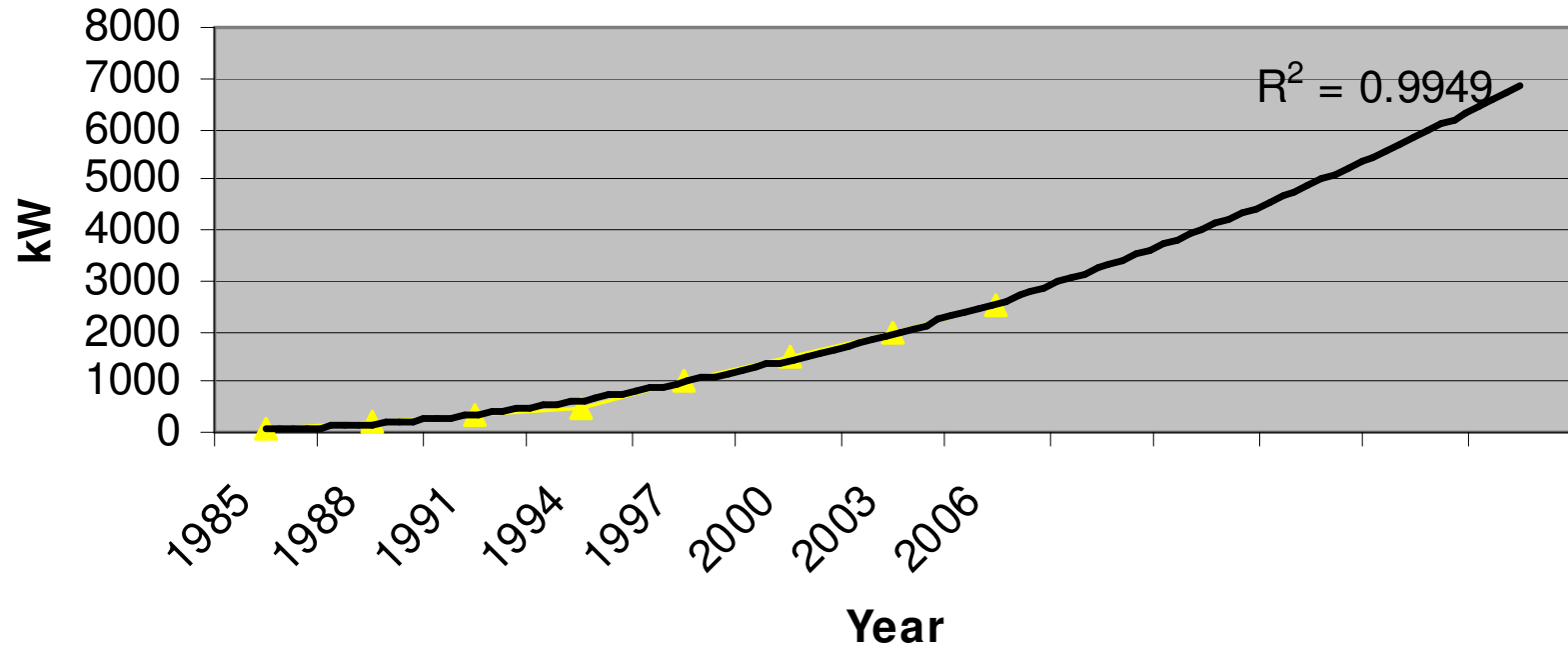
Capacity Addition 2007 (Major Countries)



Trend in WTG Size

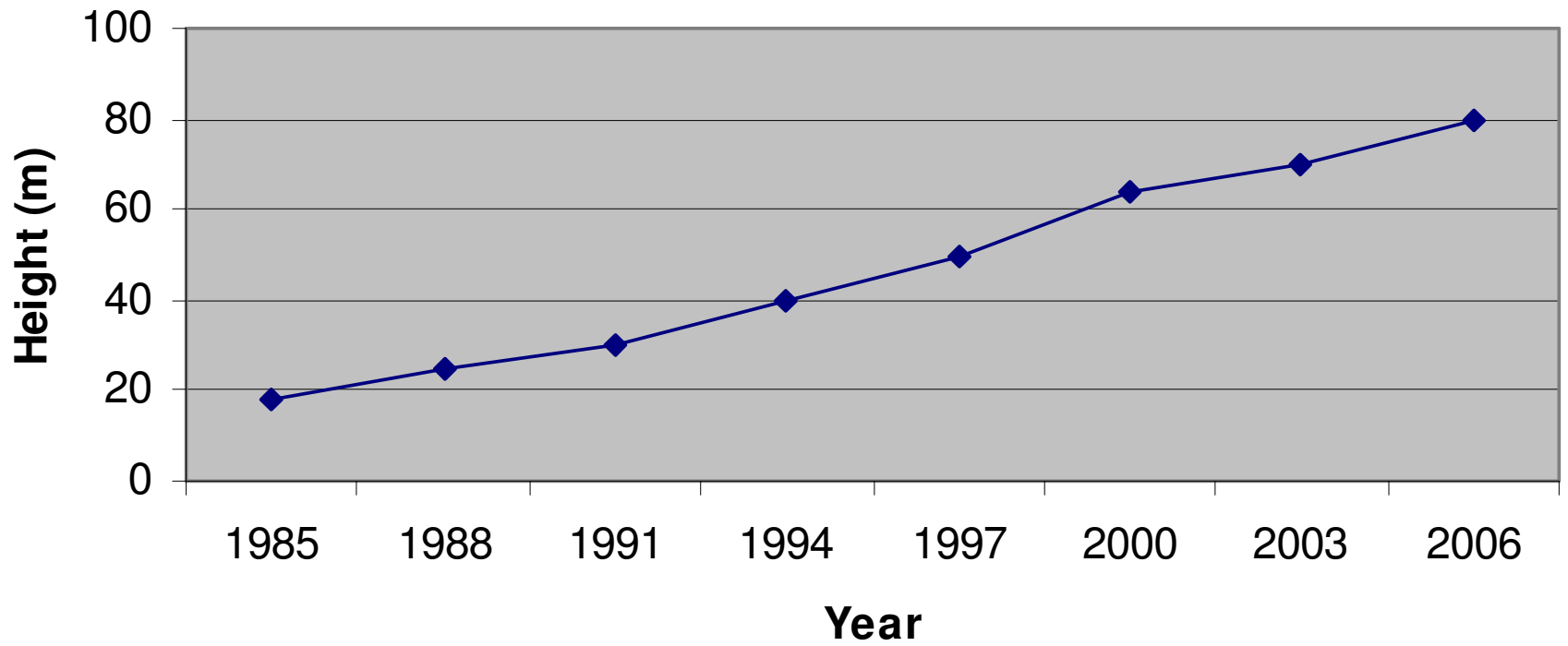


WTG Size Projection

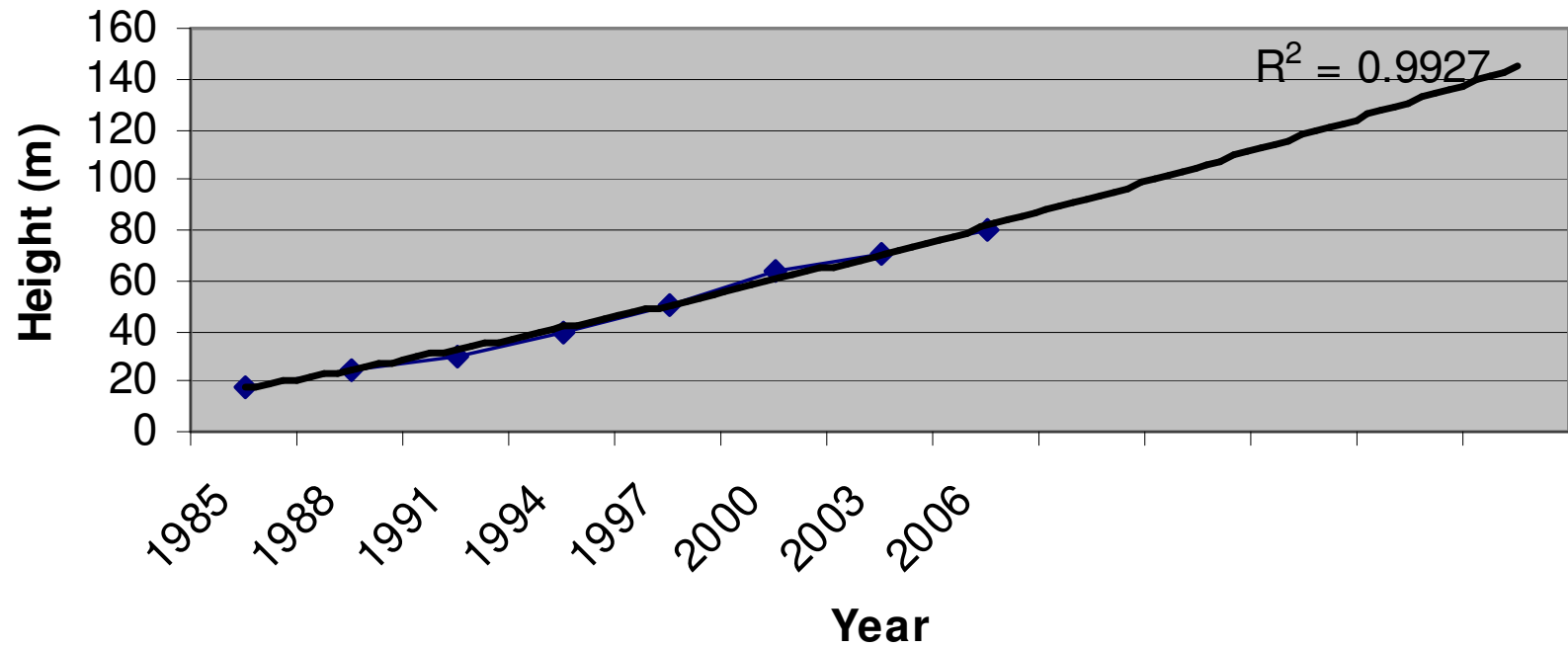


7 MW WTG by 2023

Tower Height (Trends)

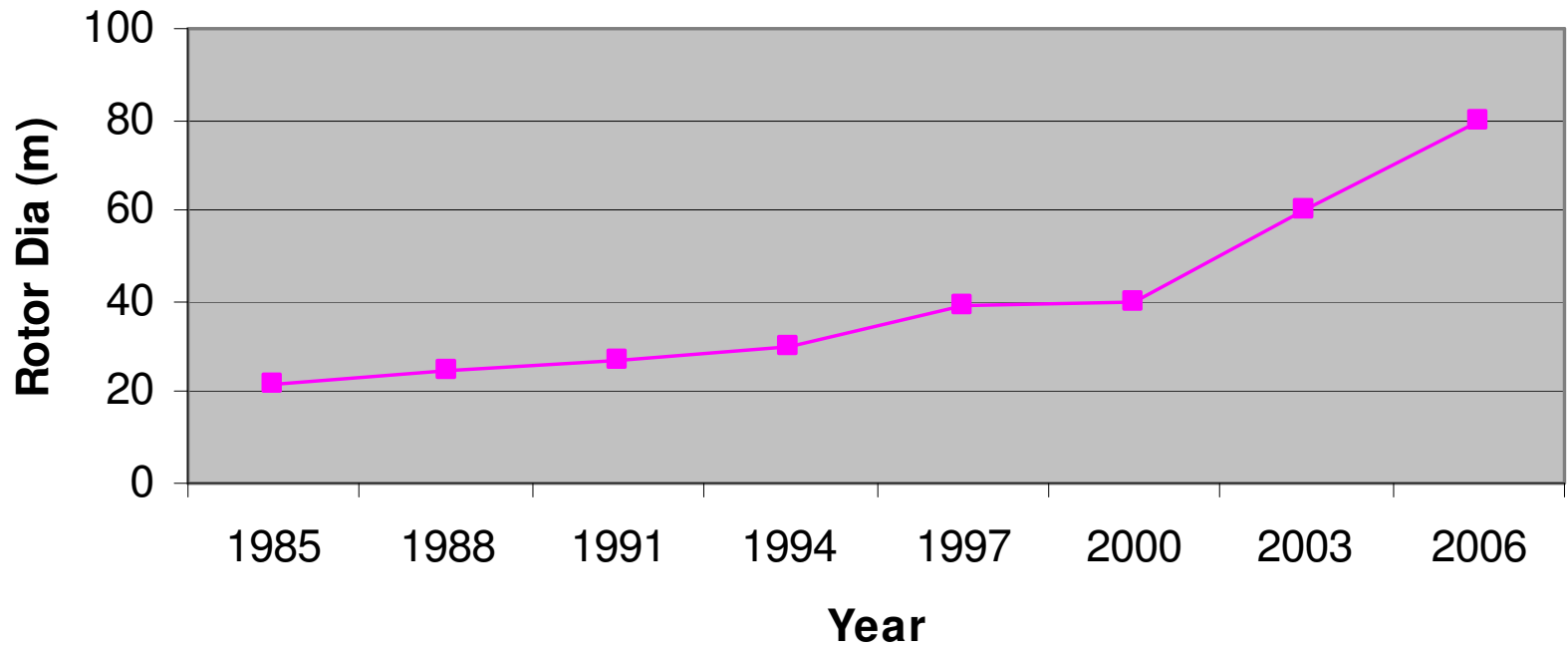


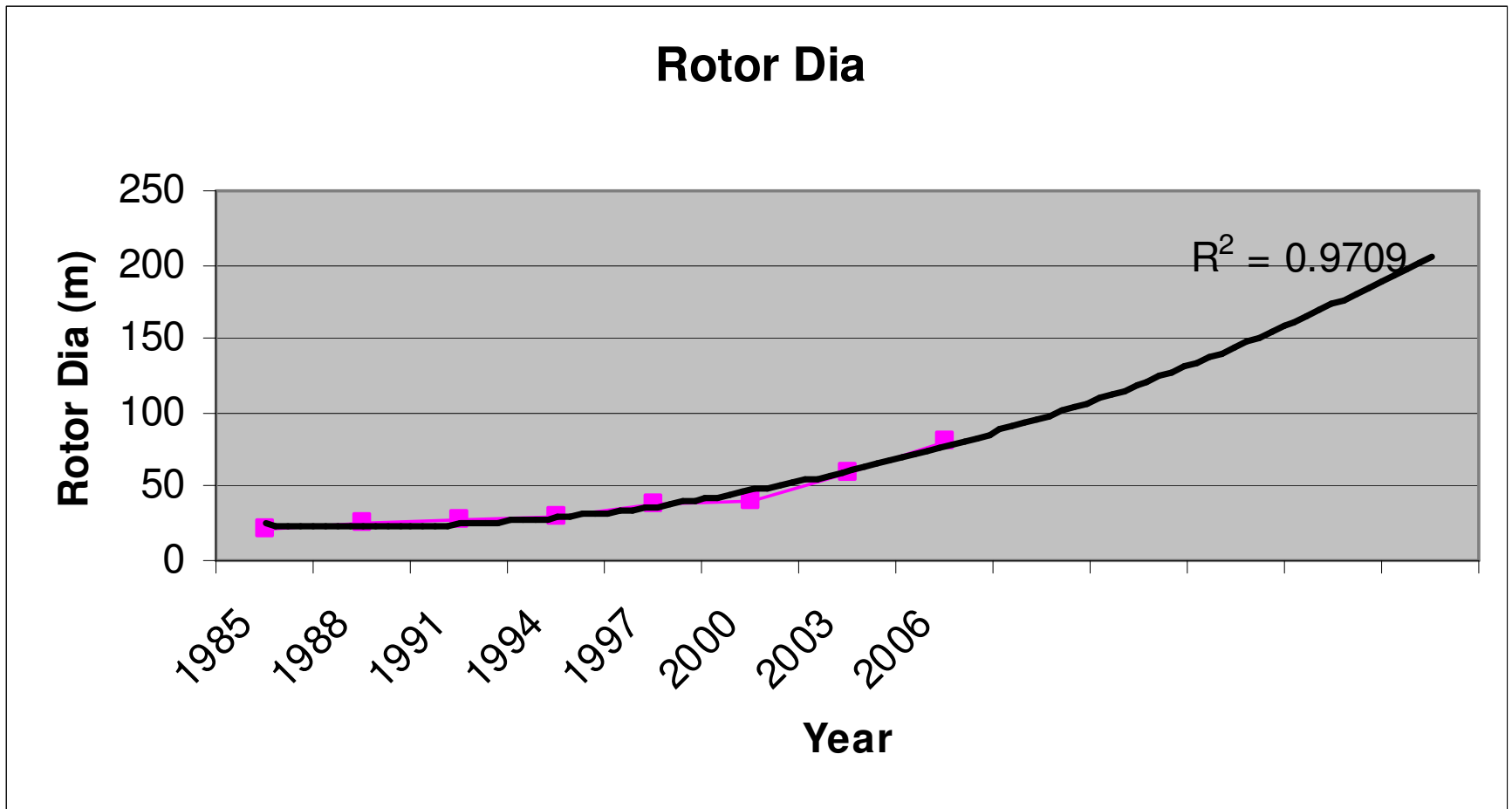
Tower Height (Trends)



7 MW WTG by 2023 with a Tower height of 140 m

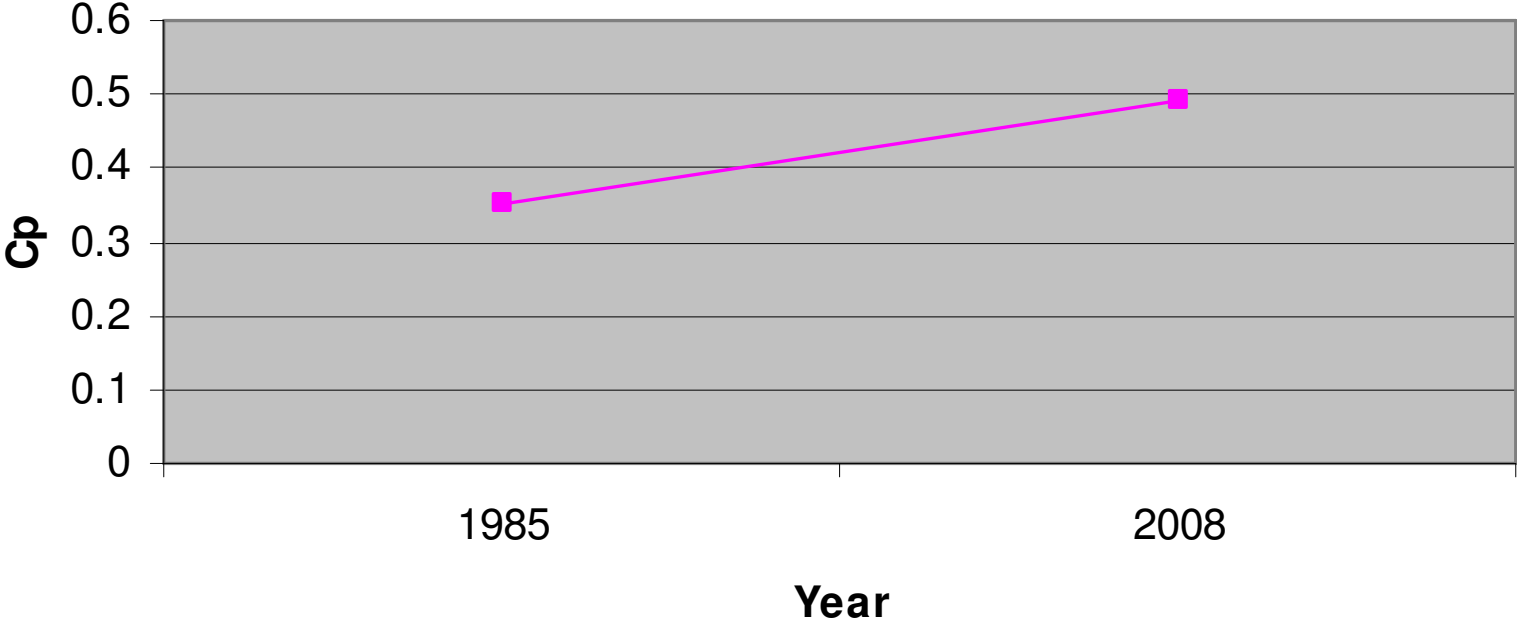
Rotor Dia



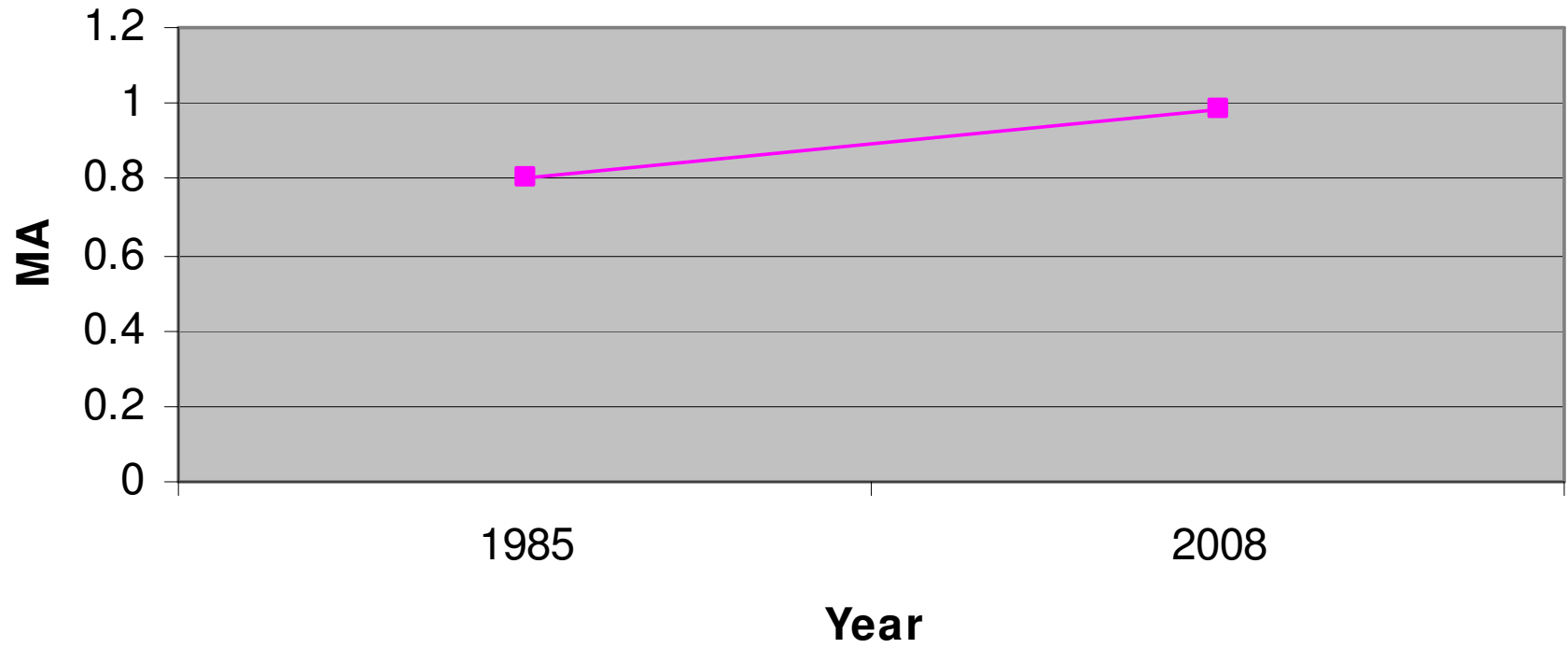


7 MW WTG by 2023 with a Tower height of 140 m and Rotor Dia of 200 m

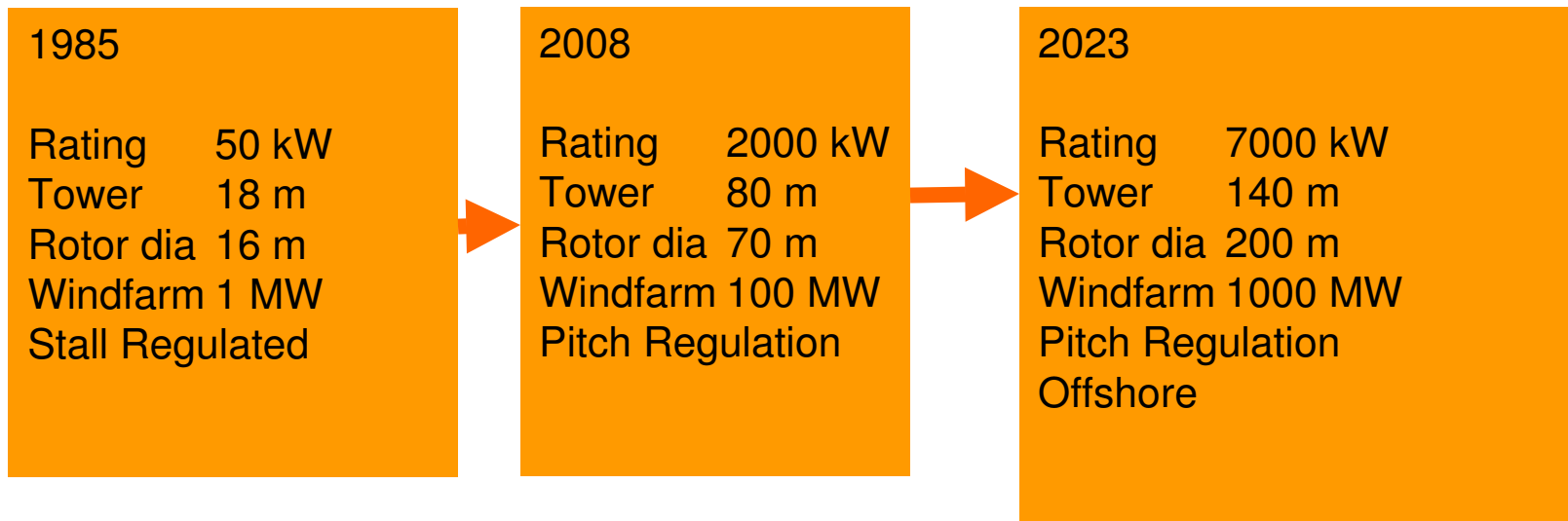
Coefficient of Performance



M/C Availability



Technology Transition



Technology Changes

- Blade Profile
- Blade material
- Fixed Pitch to Variable Pitch
- Fixed Speed to Variable Speed
- Geared to Gearless
- Induction to Synchronous generators
- Tower Height & Design
- Wind Turbine Size
- Offshore

Challenges

- Efficiency
- Structural Engineering
- Cost Optimization
- Offshore Design
- Wind Resource Assessment
- Variability
- Storage Systems
- Power Electronics & Controls