



Economic Impact of the Semiconductor Industry on Upstate New York

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SEMICO RESEARCH CORP.



Data Basis

- US Dollars (current) - not adjusted to a base year
- Revenue and shipments represent where semiconductors are shipped
- This implies the site of assembly for end products



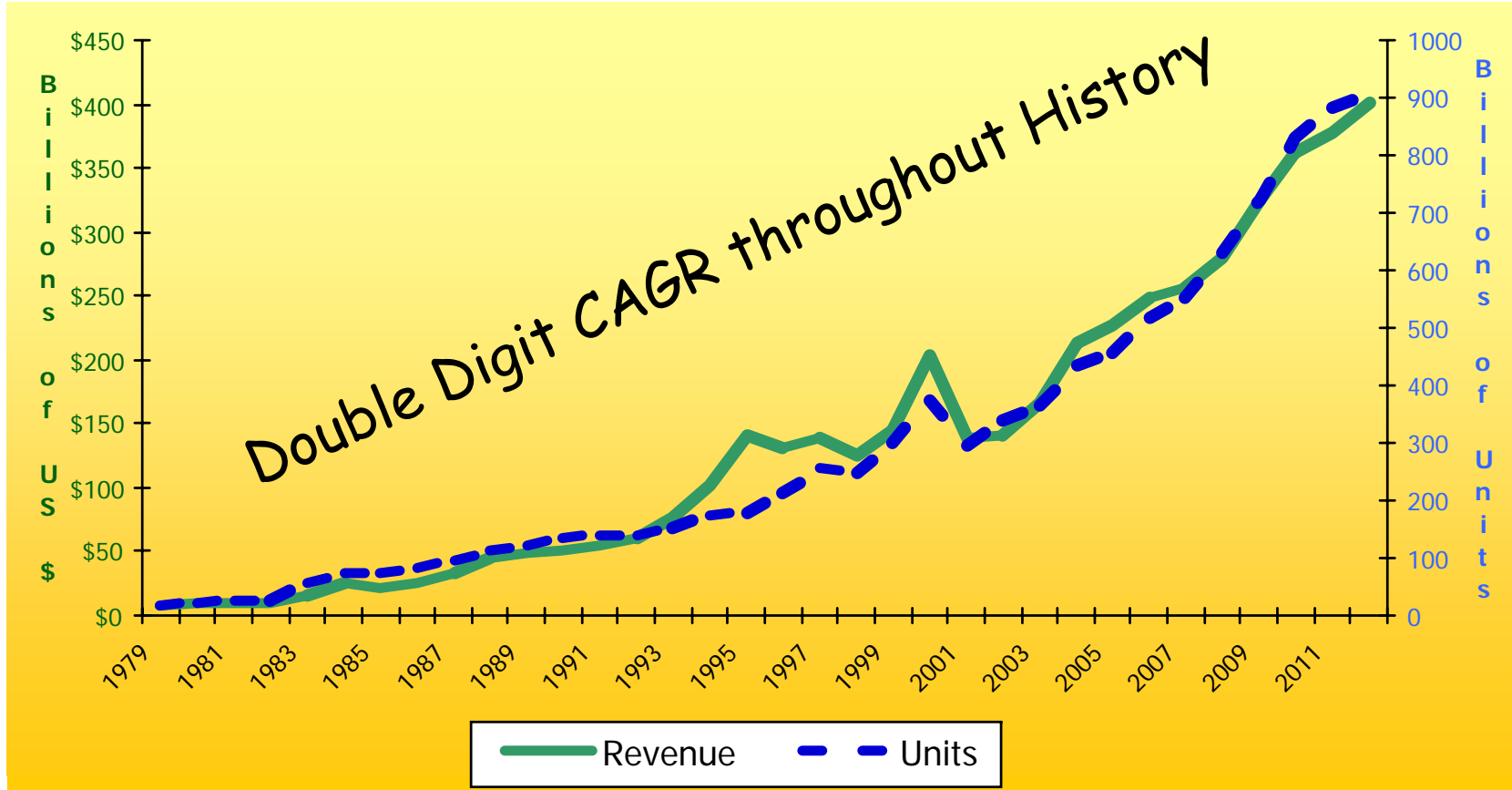
Semiconductor Industry

- Global Industry
 - US competitiveness rises with lower dollar value
 - Building technology centers creates perpetuating industries
 - Semiconductor industry spawns new enterprises even in down times
- Double digit CAGR since inception
- Leading manufacturing industry in US
- Must have manufacturing and R&D capabilities in US

NOW IS THE TIME TO INVEST

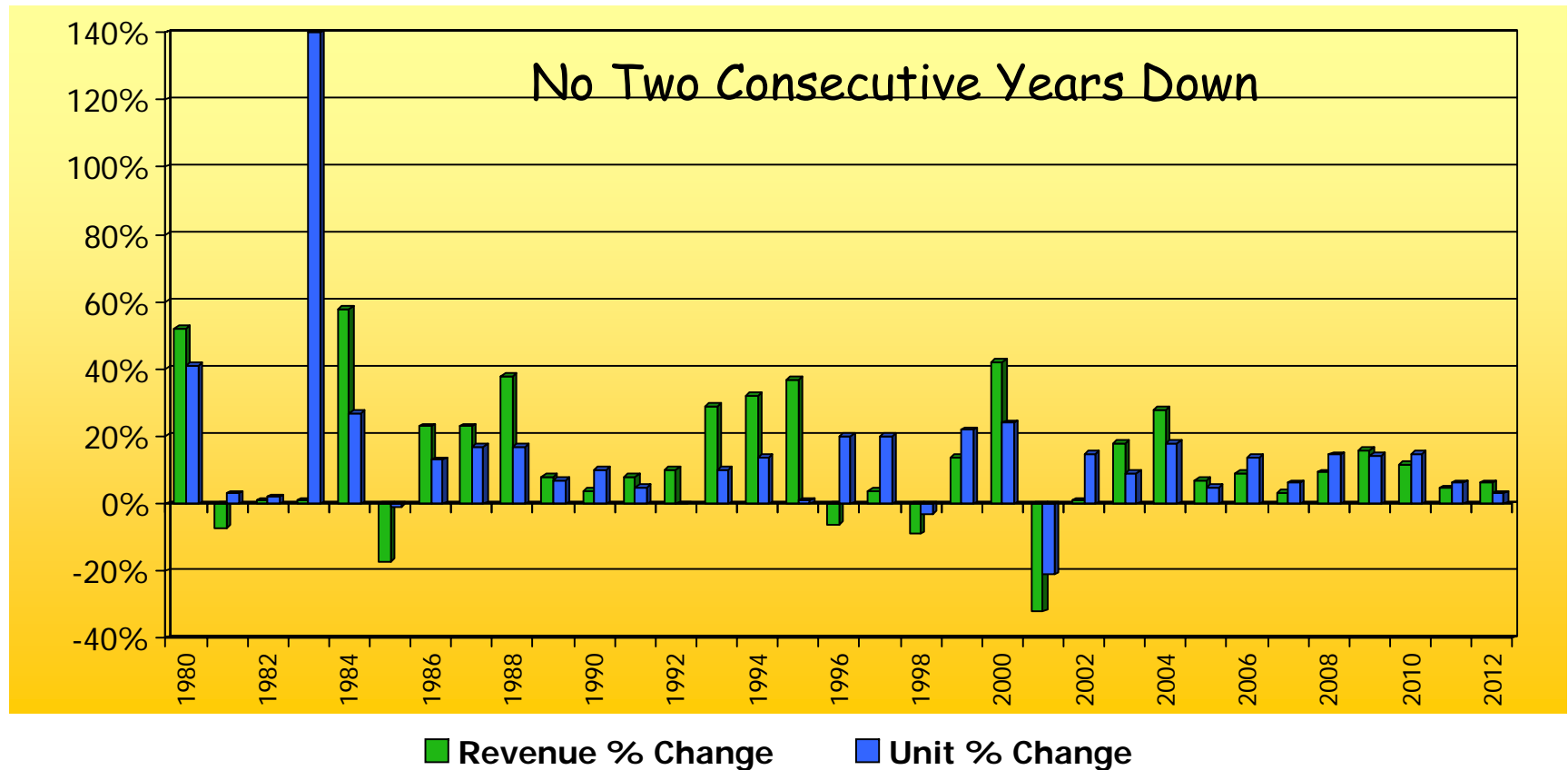


Total Semiconductor





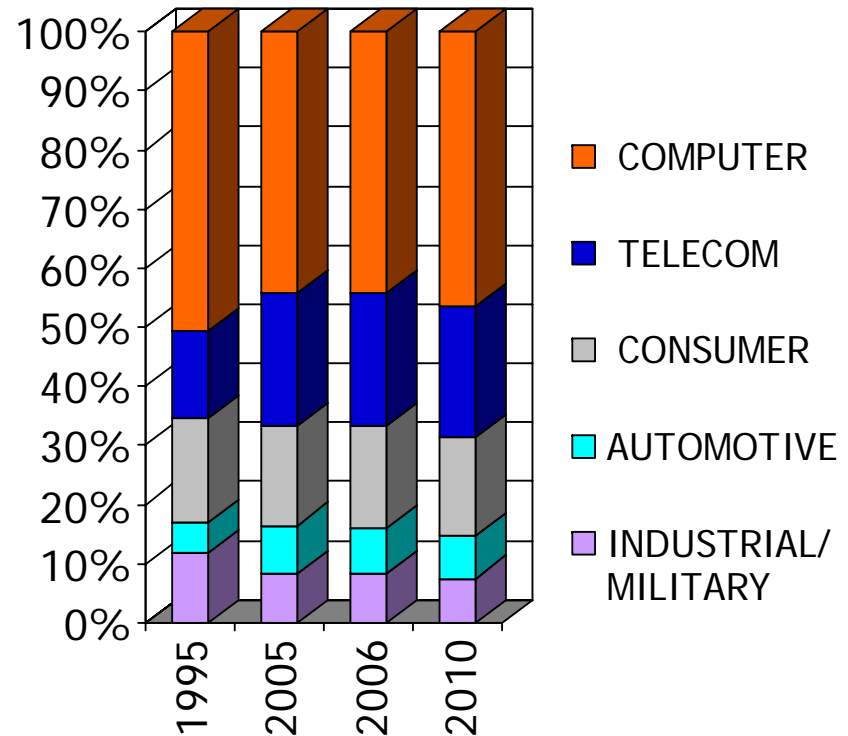
Yearly Revenue and Unit Change





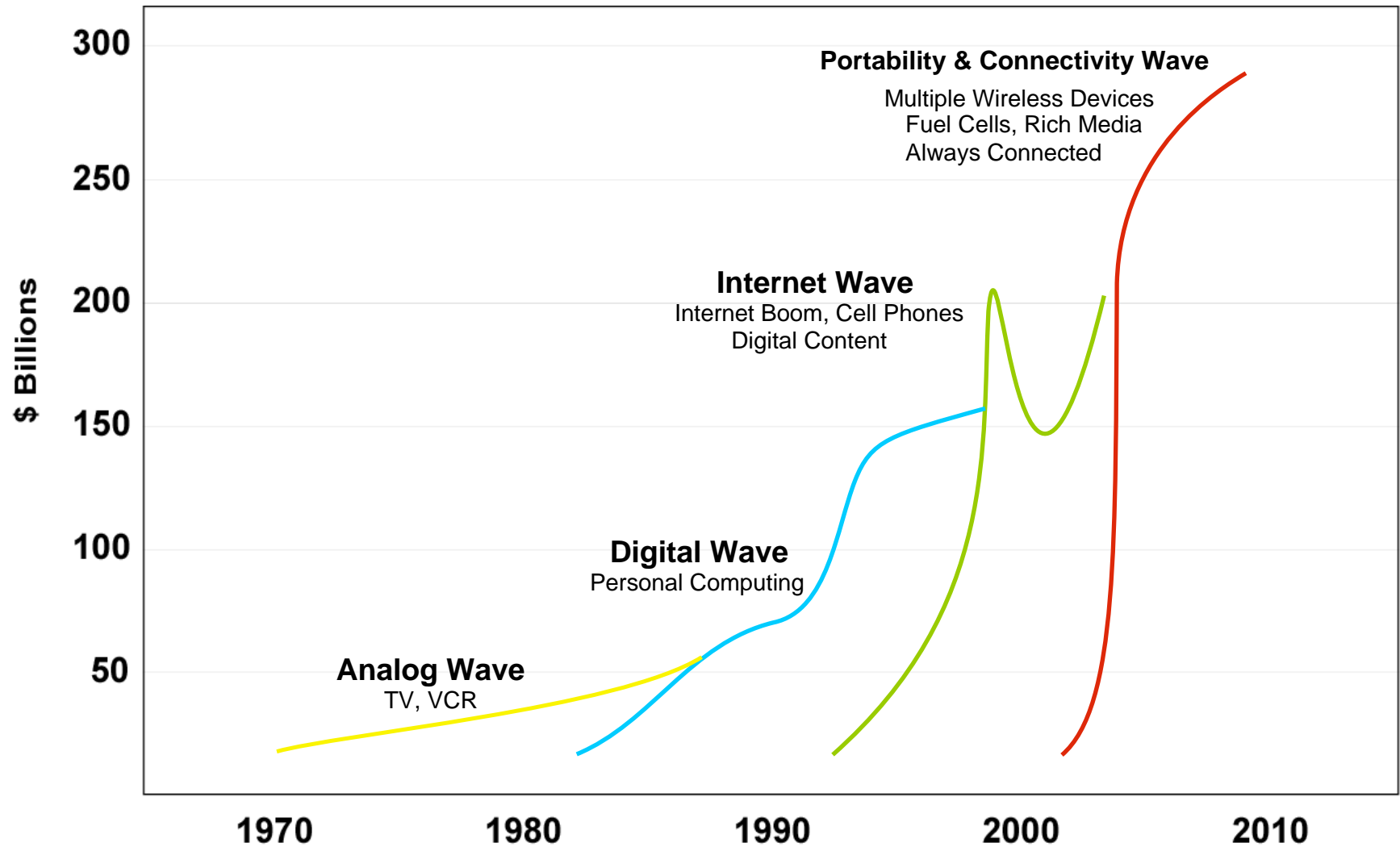
End Markets Drive Semiconductor Revenue

- End Market Percentage Relatively Stable Year to Year
- 2010 Percentages
 - Computer 47%**
 - Telecom 22%**
 - Consumer 16%
 - Automotive 7%**
 - Industrial/Military 7%**





Key Applications: Innovation





Basic and Expanding End Markets (Unit Forecast)

	2007 - 2011 5 Yr CAGR
• Desktops	2%
• Notebooks	12%
• Basic Cell Phones	8%
• High-end phones	17%
• Integrated DTV	16%
• DVD Recorders	27%
• PMP (Portable Media Players)	27%
• IP PBX	22%
• WiMAX CPE (Customer Premise Equipment)	149%
• Media Center PC	39%



US Semiconductor Industry

- Leading U.S. manufacturing industry
 - Semiconductor and Nanoelectronics is America's largest manufacturing industry in terms of value added to the U.S. economy
 - Created direct and indirect employment for nearly 1.7 million people in the U.S. in 2006
- Rose from 17th position in 1987
 - Growth of 4.3% per year (since 1991)
 - 8.6 times faster than the growth of all other manufacturing employment
 - The semiconductor industry's average annual wage is nearly twice the national average



Not Just U.S. Based Influence

- U.S.-based semiconductor manufacturers are located all over the world
- U.S.-based semiconductor companies have approximately
 - 70 fabrication facilities in the U.S.
 - and 68 in foreign countries



Not Just Semiconductor Fab Employment

- Over 4 million people employed by high-tech companies surrounding the semiconductor companies
 - Design Centers
 - Contract Manufacturing
 - Importers/Exporters
 - Electron OEMs (Original Equipment Manufacturer)
 - System Designers
 - Software Designers



Profile of US Semiconductor Industry

- U.S. 2007 Semiconductor Sales = \$42 Billion
- Worldwide 2007 Semiconductor Sales = \$256 Billion
- US 2007 World Market Share = 16% of \$256 Billion Market
- U.S. Jobs = 225,000
- World Jobs = 1,0223,000
- Percent of Sales Outside U.S. Market = 78%
- Capital Equipment = \$11 Billion, 10% of Sales
- R&D Investment = \$18 Billion, 17% of Sales
- Historically 25-30% of revenues invested in the future



Semiconductor Industry and GDP

- Top 15 countries account for over 77% of the World's GDP
- The Semiconductor Industry represents just over one half of one percent of the World GDP
- It is approaching 2% of the total U.S. GDP



Positive Set Up for 2009

- Good semiconductor revenue in 2008
 - Increased demand will roll into 2009
- End markets provide long term growth
 - iPhone stimulates new designs & spurs upgrades
 - New products imitating iPhone
 - Innovations beyond iPhone
 - TV and Set Top Box improves as digital broadcasting emerges
 - Consumer adoption increases
 - PC market experiences increased upgrade cycle
 - Important base market still growing



Geographic Trends

- Expansion of Global Market
 - Products manufactured closer to end user
 - Semiconductor fabs move closer to end product manufacturer
- Technology of semiconductors also important
 - Highest ASPs in North America for leading edge ICs
 - Avoidance of foreign tariffs
 - Attractive currency exchange
 - Potential Opportunity for companies to build in the US



Positive Signs for 2008

- US and World Economy Improves in 2008
 - Election Year in US and Taiwan
 - Olympics in China
 - Higher ASPs in 2008
 - Inventory under control
 - Dollar value spurs international sales
 - Attractive currency rates stimulate investments
 - Capacity utilization Increases
 - Housing market improved
 - Reduced Capex investments in 2007 result in tight capacity in 2008:
 - Leads to stable ASPs
 - Industry revenue growth
 - Demand for new fabs



Macro Economic Flags

- Oil Prices – Peaking
 - Currently \$100 Plus per barrel
 - OPEC hinting at increasing production
- Housing market depressed but improving
 - Lower interest rates helping
 - New liquidity will help Interest
- Deficit
 - Inflation worries
- Employment News Mixed
- Middle East conflict fuels uncertainty
- Economies outside US are good
 - US exports strong, helped by weak dollar



Upstate New York



Upstate New York - Strengths

- Strong educational institutions
- University at Albany has a state-of-the-art prototyping laboratory
- Albany NanoCollege known worldwide
- Albany, IBM and international Sematech attract scientists from global community
- State government recently funded a \$1 billion high technology initiative to fund advanced university R&D and economic outreach
- Large number of engineering graduates
- Good infrastructure in place to support semiconductor fabs
- Good skilled work force
- Transportation infrastructure in place or planned
- Reliable utilities infrastructure in place
- Attractive rural lifestyle – family friendly



Upstate New York: Resources Required to Meet Industry Needs

- Highly-Skilled, Reliable Workforce
 - New York State
 - Ranks third in high-tech employment
 - Worker productivity well above national average
 - More than 414,171 students enrolled in state universities in 2005-2006 Academic Year
 - 79,316 degrees granted annually
- New York's Tech Valley
 - 60,000 underemployed workers in Tech Valley
 - 40 colleges and universities located in the region
 - 20,392 higher education graduates annually
 - More than half in technical and engineering fields



New York: Over 190 SEMI Members and Other Vendors/Suppliers

ASML **Applied Materials** **Tokyo Electron** **Ceramtech**
Schenectady International **Corning** **CLESTRA Cleanroom** **Eastman**
Kodak **Couriertronics** **Canon USA Inc.** **Veeco Instruments, Inc.**
Mitsubishi Chemical **DuPont Photomasks** **Hitachi Metals**
American Dicing **LOREX Industries, Inc.** **Planar Semiconductor**
Navitar **Sono-tek Cleaning Systems** **Indium Corp of America**
Amphenol Corp **Carborundum Corp** **Praxair** **Allied Signal, Inc.**
Williams Advanced Metals **Air Products & Chemicals**
Honeywell **Aalborg Instruments & Controls** **General Semiconductor**



Upstate New York: Strategic Location High Tech Crossroads

- Northeast cluster of wafer fabs
- Close proximity – within half day drive to NYC, Buffalo, Boston and Montreal
- Expansive transportation systems with growth capacity
- Easy highway access to Interstates 90, 87 & 81
- Stable geological conditions
- Attractive 4-season meteorological climate
 - No weather related work stoppages



Upstate New York - Threats

- Increased competition from other geographic semiconductor centers
 - Singapore, China and Taiwan
- Semiconductor cycles
- Need to get first fab built
 - Attracts other support businesses



Competitive Opportunities for Upstate New York versus Germany

- Weak dollar makes foreign investment in the U.S. more attractive
- European companies like East Coast locations to have a presence in the U.S.
- Total management change at Qimonda / Infineon from inception
 - Former Infineon CEO key player in location of Infineon / Qimonda in Dresden



Competitive Opportunities for Upstate New York versus Portland

- Not dominated by Intel
- Scientific community developing next-generation technology and products
- Rural atmosphere – reminiscent of why many located in Oregon at the beginning
- Opportunity to build a new region for companies
- Association with Albany NanoCollege and Sematech



Competitive Opportunities for Upstate New York versus Taiwan

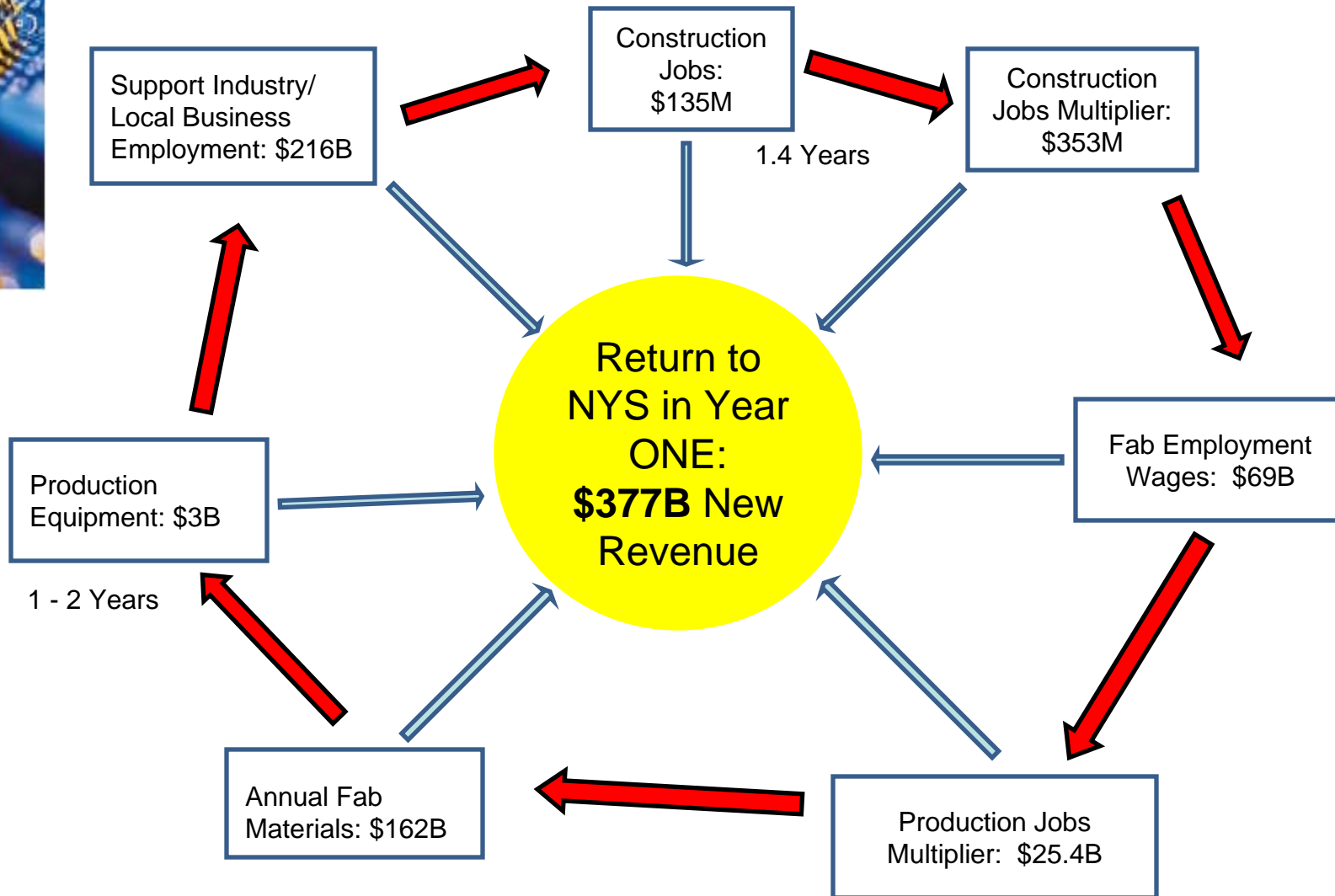
- Close to R&D technology development occurring on the east coast
- Attractive rural life style
- More opportunities to attract skilled workers for lifestyle
- Prestige of working with Albany NanoCollege



Return on Investment for the State of New York



Added GDP Greater than First Year State Cash Outlay





Support Business for a Fab

- Includes but not limited to:
 - Fab garment cleaning
 - Computer sales maintenance
 - Warehousing
 - Delivery service
 - Chemical disposal
 - Satellite equipment offices
 - Specialty products
 - Maintenance
 - Training
 - Private security



Support Business Effects



Direct State Generated Revenue and Additional Business

- Income Taxes \$14.4 million
- State sales taxes \$19.2 million
- County sales taxes \$20.3 million
- Added business to economy \$370.1 million



Multiplier Affect for Support Business

- Additional Jobs 2,419
- Additional earnings \$98 million
- State sales tax \$2.1 million
- County sales tax \$2.2 million
- Additional state income tax \$6.7 million



State & County Revenue Gains

- Phase 1 Construction = 1.4 years
 - Labor \$135,000,000
 - Multiplier effect \$353,480,000
 - State income taxed from labor \$ 16,339,305
 - Sales Taxes W2 labor & Multiplier effect \$15,534,225
- Phase 1 construction is for shell only
- Phase 2 Annual Production
 - Multiplier effect \$370,104,749
 - Income Taxes from W2's \$ 7,696,660
 - State & County Sales Taxes \$ 39,558,455



5 Year Impact

- 5 year direct tax* revenue increase:

\$341,914,615

- 5 year additional GDP from multiplier effect:

\$2,840,249,119

* sales/income tax for consumables in the fab and increased purchases
by new consumers



10 Year Impact - Billions of \$\$

- 10 year State direct tax* revenue increase: \$711,773,111
- 10 year County direct tax* revenue increase: \$414,028,530
- 10 year additional GDP from multiplier effect: \$5,678,840,086

* sales/income tax for consumables in the fab and increased purchases by new consumers



Breakeven Calculation

- Breakeven calculation:
 - summing the value of additional taxes
 - plus the additional value added to local economy
 - i.e. similar to calculating value additions to GDP



Breakeven – First 12 Months

- Breakeven on the investment by New York State occurs in first 12 months from the start of construction
- Added GDP to the economy is greater than the first year state cash outlay



Five Year Net Present Value of Investment

- Semico presents a 5 year Net Present Value (NPV) of the investment compared to added benefits to the economy and increase in taxes
- NPV is assuming a 5% interest rate and a \$650 million investment from the government over 6 years
- Five year ROI in current dollars is 466%



Cost per Job to New York State

- Assuming \$650,000,000 investment by New York State
 - Cost per job \$117,884 includes:
 - Construction personnel
 - 1500
 - Fab employment starts in year two
 - 1160
 - Outside fab support
 - 435
 - Support industry and local business jobs
 - 2419



Overview of Economic Impact

- Employment of entry level personnel
 - Skill set
 - One year experience
 - Salaries
 - Wafer operators \$40,000 (Average starting salary without benefits)
- Employment for educated/experienced workforce in the area
 - Skill set
 - Engineers 80% or 352 moving to area
 - Management 70% or 69 moving to area
 - Support Staff 40% or 26 moving to area
 - Fab operators 30% or 148 moving to area
 - Salaries
 - Engineers average salary \$75,000
 - Management average salary \$110,000



More Economic Impact

- Fab revenue generation potential for corporate taxes
 - Ten years no taxes
- Stimulate real estate and housing market
 - Estimate an increase in real estate of about 15% in 2-3 years
- Stimulate local area secondary businesses (restaurants, retailers, hotels, etc.)
 - Franchises of major chains operated by local residents in addition to local favorite spots
- Stimulate local area schools, healthcare, etc.
 - Assuming 1.5 children per household, 894 new children to schools
- Workforce education and retraining programs
 - If only recruit 30 - 60% of employment from out of the area, will need workforce education and retraining from local schools and company programs



Additional Investors/Businesses

- Equipment suppliers
- Material suppliers
- Universities
- Hospitals
- Services - doctors, lawyers, accountants
- Retail stores
- Importers/Exporters
- Cultural - galleries, museums, concerts
- Contract manufacturers
- Distributors
- Designers - software and hardware
- Small businesses
- Venture capital investment



Summary Sheet

Required investment and metrics for New York State include:

- Anticipated number of jobs = 5,514
 - Direct and indirect
- Assumptions
 - \$650 Million investment by New York State
 - \$300 Million invested in the first three years
 - \$350 Million R& D investment over ten years
 - Investment cost of \$117,884 per job created
 - Direct and indirect jobs include fab employment, support services and additional jobs generated in the community
- ROI
 - 5 yr = 466%
 - 10 yr = 609%
- Breakeven years and months
 - Within first year




Return to the State of New York

	State Revenue	Added GDP	Total
Year 1	\$23,884,500	\$353,480,000	\$377,364,500
Year2	\$40,516,680	\$537,990,331	\$578,507,012
Year 3	\$41,732,181	\$554,130,041	\$595,862,223
Year 4	\$42,984,147	\$570,753,943	\$613,738,089
Year 5	\$44,273,671	\$587,876,561	\$632,150,232
Year 6	\$45,601,881	\$605,512,858	\$651,114,739
Year 10	\$51,325,318	\$681,510,056	\$732,835,375



Upstate New York Semiconductor and Nanoelectronics Synergies

- Upstate New York has a history of Nanoelectronics
 - Past 10 years the State of New York has developed a significant foothold in Nanotechnology
 - \$4 billion invested in Albany NanoCollege
 - Luther Forest Technology Park
 - 300 acre Marcy NanoCenter at the State University of New York Institute of Technology
 - Upstate New York can capitalize on the success of  program
 - Nanotechnology and the semiconductor industry are synergistic
 - Cornell University NanoScale Science & Technology Facility
 - International Sematech headquarters in Albany at Albany NanoCollege
 - IBM in East Fishkill





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