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Florida Cluster Strategy

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Key challenges for Florida's Future

- Quality of economic growth
  - high wage, high skill, high productivity
- Leadership in an increasingly knowledge-based economy – Innovation Economy
- High Performance Clusters and Talent as engines of innovation
  - Clusters are dynamic with emerging technologies
  - Strategic intelligence for the long view

Targeted Clusters

- Life Sciences
- Aviation/aerospace/space
- Homeland security/defense
- Information Technology
  - computer systems and software, microelectronics, telecommunications, MS&T, photonics/optics, digital media
- Financial and Professional Services
- Clean Energy – *new*
- Strategic Challenges
  - R&D, corporate HQ, manufacturing

Life Sciences

- **Biotechnology**
- **Pharmaceuticals**
- **Medical Devices**
- **Health Care**

- **$800+ billion combined 2006 global revenues**
- Driven by scientific advancement – R&D
- Talent key: world class scholars to high skill technician base

Technology convergence:

- Biotech supplementing pharma pipeline
- Biotech/pharma, biotech/med dev, biotech/ IT tools and products
- Genomic advances on diagnostics, therapeutics

Emerging Technologies

- personalized/molecular medicine
- RNAi therapies (gene silencers)

	Current Market Size	Strong Growth Projection	Florida Industry Strength	Florida Research Strength	Florida Opportunity
Cardiovacular Therapeutics & Devices	$53 bil.	☑	☑	☑	☑
Central Nervous System Disorders	$46 bil.	☑		☑	☑
In Vitro Diagnostics / Molecular Diagnostics	$32 bil.	☑	☑	☑	☑
Infectious Disease	-	☑		☑	☑
Oncologics	$35 bil.	☑		☑	☑
Ophthalmology Therpeutics & Devices	-	☑	☑	☑	☑
Orthopedics	$16 bil.	☑	☑	☑	☑
Regenerative Medicine	-	☑	☑	☑	☑

selected from 16 identified life sciences market segments

Aviation & Aerospace

- **Aviation**
- **Aerospace**
- **Space**

- **$1.3 trillion combined global revenues**
- Drivers; R&D and Talent (aerospace engineering)

- ***NextGen Aircraft***
  - composite materials, nanotechology
- ***Space – beyond launch***
  - R&D, manufacturing, commercial applications and tourism
- ***Emerging Technologies:***
  - Advanced avionics
  - Composite/advanced materials
  - Alternative fuels and power sources
  - Space technologies

	Strong Growth Projection	Florida Industry Strength	Florida Research Strength	Florida Opportunity
NextGen Aircraft Systems	☑	☑	☑	☑
Avionics	☑	☑	☑	☑
Modifications, Conversions, & Retrofitting	☑	☑	☑	☑
Missile Guidance & Air Defense Systems	☑	☑	☑	☑
Space Technologies	☑	☑	☑	☑
Launch Services	☑	☑	☑	☑

Homeland Security

- **Information Analysis & Security**
- **Threat Detection & Prevention**
- **Emergency Preparedness, Response, & Recovery**

- **$55.6 billion global market in 2006**
- Defined by application - rapidly maturing industry

A composite industry:

- Photonics, MS&T, computer systems, aerospace, defense, life sciences

Emerging technologies:

- CBRNE sensors (handheld and remote devices)
- Cargo security / screening technologies
- Counter IED (explosives) technologies
- Predictive analytics, information sharing
- secure wireless communications
- People screening technologies/biometrics

	Projected Market Value 2006-2010	Strong Growth Projection	Florida Industry Strength	Florida Research Strength	Florida Opportunity
CBRNE Detection (chem, bio, rad, nuclear, explosives)	$20 bil.	☑	☑	☑	☑
Aviation Security	$10 bil.	☑	☑	☑	☑
Port Security	$8 bil.	☑	☑	☑	☑
Cybersecurity / Information Security	$11 bil.	☑	☑	☑	☑
Domestic & Foreign Intelligence	$30 bil.	☑	☑	☑	☑
Emergency Preparedness & Response	$16 bil.	☑	☑	☑	☑

selected from 10 identified homeland security market segments

Clean Energy

- **Solar**
- **Biomass Energy & Biofuels**
- **Hydrogen & Fuel Cells**
- **Ocean**
- **"More than Renewables"**

- **$47+ billion global market 2007 for just solar, biofuels, and fuel cells**
- Technology innovation/R&D a key driver

- **Clean energy industry offers more than environmental benefits:**
  - Opportunity to establish technology leadership – become "Silicon Valley" of clean energy industry

- **Emerging Technologies**
  - thin films, coatings, and other advanced materials for solar
  - cellulosic ethanol / biodiesel enzymes and catalysts
  - fuel cell materials, membranes, and related technologies
  - underwater turbines, coatings/materials

	Strong Growth Projection	Florida Industry Strength	Florida Research Strength	Florida Opportunity
Solar Materials & Electronics	☑	☑	☑	☑
Biofuels	☑		☑	☑
Biomass Energy Technologies / Processes	☑		☑	☑
Fuel Cells	☑		☑	☑
Hydrogen Technologies	☑		☑	☑
Ocean Energy Technologies	☑		☑	☑
Clean Fossil Energy (Turbines, Materials, sim.)	☑	☑	☑	☑

Environmental Technology *(preliminary findings)*

Key Market Segments

- Energy efficiency/Green design
- Recycling and Waste
- Water, Wastewater
- Air/Environment

Emerging Technologies

- Membrane technologies (water, air)
- Bioremediation
- Desalination
- enzymes/catalysts for mfg/industrial processing

- **$652 billion global revenues in 2005**
- Florida ranks 4th in U.S. in environmental industry revenues ($14+ billion) and employment (83,000)

Environmental industry showing solid growth, especially in more high tech segments

- Resource / commodity prices, demand for “green” goods, and policy driving markets
- Some sectors have high R&D intensity (e.g. monitoring, instrumentation, water equipment)—new technologies crucial to growth

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Nanotechnology

Nanotechnology- a disruptive, enabling technology for future competitiveness

- **biotech**
  - nano-biosensors
  - nano-coatings for therapeutics
  - nanoparticles to carry genes, drugs, biologics
- **aerospace**
  - nanomaterials with enhanced strength-to-weight ratios, embedded sensors
  - nanocoatings that are stronger and lighter
  - nanoelectronics / nano-engineered display technologies
- **Homeland Security**
  - nanosensors for CBRNE detection
  - nano enabled sensing, and electronics / communications systems
  - nanomaterials for first responder clothing and equipment, stronger building materials
- **clean energy**
  - nanomaterials for thin films, fuel cells, batteries
  - nanoengineered catalysts for biofuel production
- **environmental technologies**
  - nanomaterials for membranes and films
  - nanocoatings for insulation, wiring, glass
  - nanoparticles for bioremediation

Worldwide Nanotechnology Market Predictions for 2010-2015 (Annual Market Size)

- **Manufacturing:**
  High performance / nanostructured materials and processes……..340 billion
- **Electronics**
  Semiconductors and integrated circuits……$300 billion
- **Biotechnology/Pharmaceuticals**
  Nano-enabled treatments……..$180 billion
- **Chemical Plants/Refineries**
  Nanostructured catalysts for chemical and petroleum processing……..$100 billion
- **Aerospace**
  Lighter, faster, safer nano-enabled products for vehicles, components, etc…….$70 billion

Roco and Bainbridge (NSF), "Societal Implications of Nanoscience and Nanotechnology", March 2001

SIZE OF SELECT FLORIDA INDUSTRIES TO BE IMPACTED BY NANOTECHNOLOGY

Florida Industry	Companies	2005 Employment	Total Wages ($Billions)	Average Pay
High Tech Manufacturing*	836	51,046	$3.305	$64,746
Aerospace Manufacturing	200	17,814	$1.157	$64,955
Biotechnology, Pharmaceuticals, and Medical Device Manufacturing	488	24,571	$1.250	$50,859
TOTAL	**1524**	**93,431**	**$5.712**	**$61,134**

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Florida's leadership for the 21st Century Innovation Economy will depend upon the critical economic development / education connection

- **R&D for emerging technologies, competitive clusters of the future**
- **Talent Pipeline**