



Genome
BritishColumbia

Leading > Investing > Connecting

IEA Bioenergy Conference
Biofuels & Bioenergy: A Changing Climate

***“The Role of Genomics in
Biofuels Innovation”***

Pierre Meulien, Ph.D.
Chief Scientific Officer

August 24th, 2009

Genome British Columbia

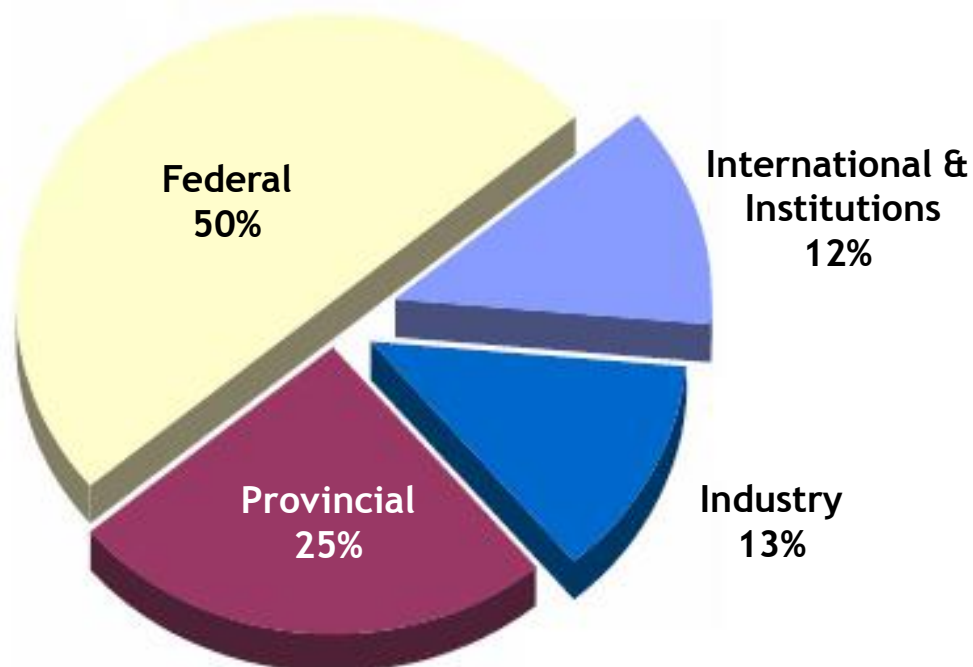
- Creating a **world-class** genome sciences region
- On track to exceed the second \$300M plan for 2005-2010 with \$307M in approved research to date
- Focusing on B.C.'s key **economic and social needs** in the areas of health, agriculture, forestry, fisheries, mining, bioenergy and the environment
- Linking to **strategic international partners** (over 100 research and funding collaborations)
- Relative to population, the most **successful province** in Canada (25% in federal competitions)
- Leveraging BC's economy as the ***Life Sciences Province***

Context for Genome BC's Next Strategic Plan (2010-2015)

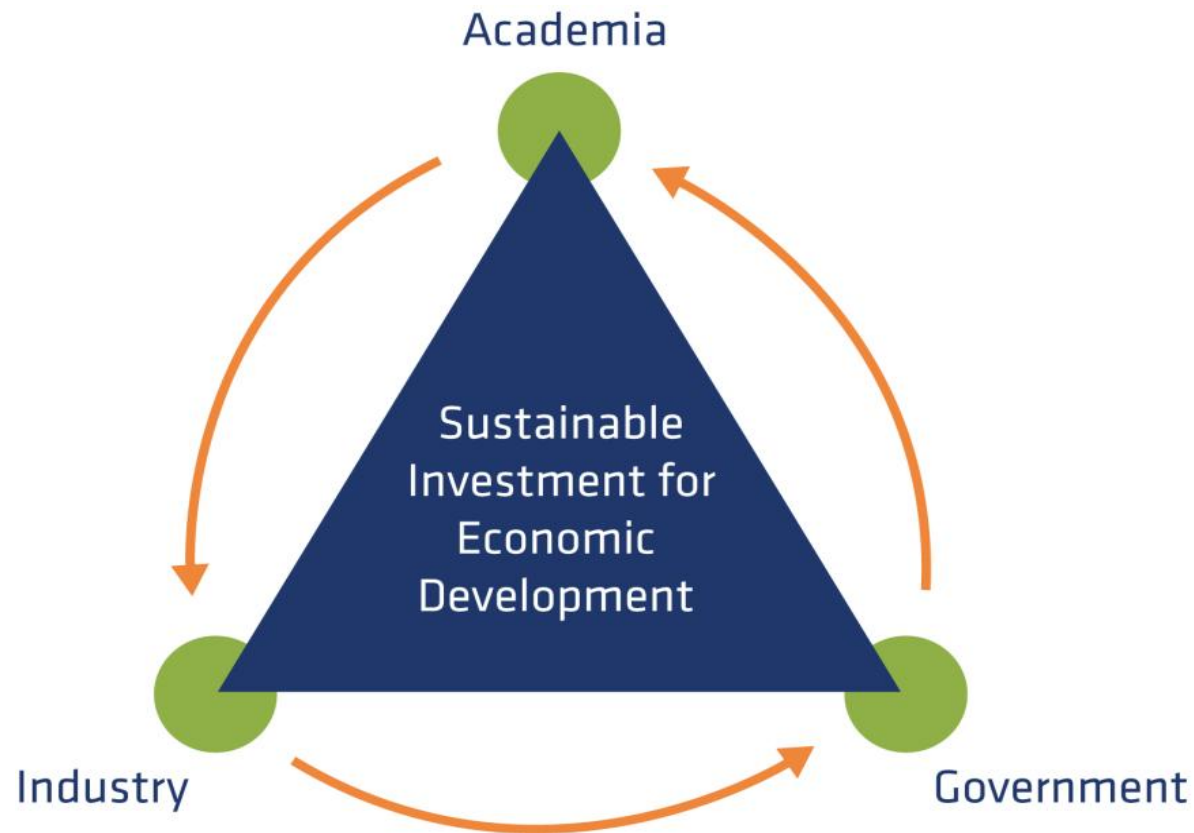
- Genome BC's first Business Plan 2001-2005 \$69M
Provincial Contribution - \$27.5 million
- Genome BC's second Business Plan 2005-2010 \$300M
Provincial Contribution - \$75 million
- Genome BC's third Business Plan 2010-2015 \$340M
Provincial Contribution (to date)- \$50 million

Achievements to Date - Investment Sources

INVESTORS:



Genome BC - Role

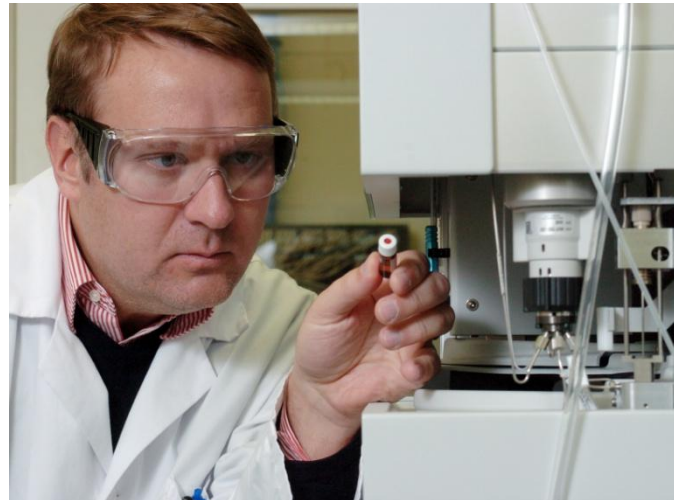


Genome British Columbia Funded Platforms

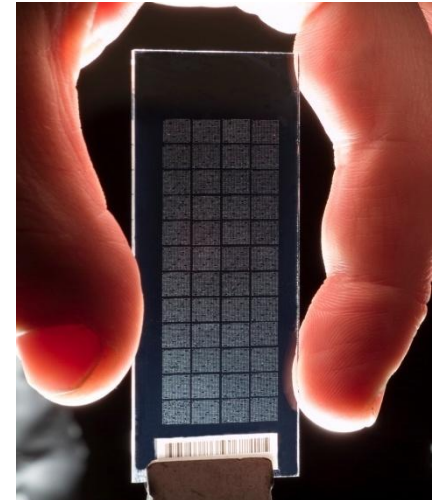
Genomics (BCCA)



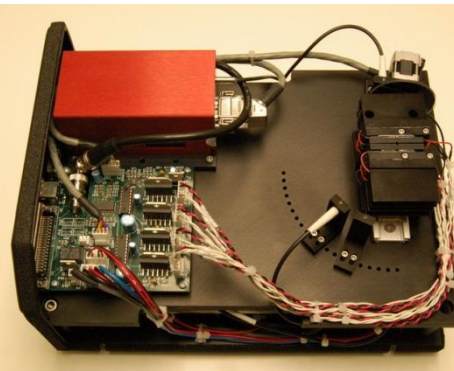
Proteomics (Uvic)



Microarrays (VGH)



Technology Development (UBC, BCCA, iCAPTURE, Uvic, BCIT)



Presence Across British Columbia



SIMON FRASER
UNIVERSITY

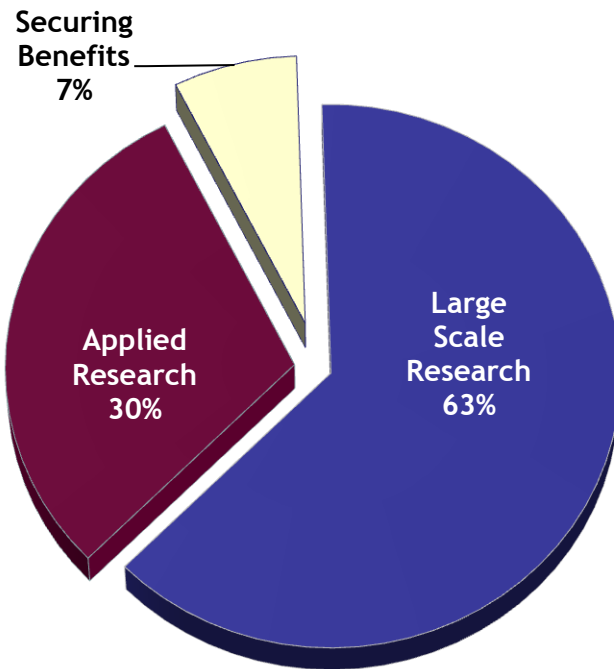


St. Paul's Hospital

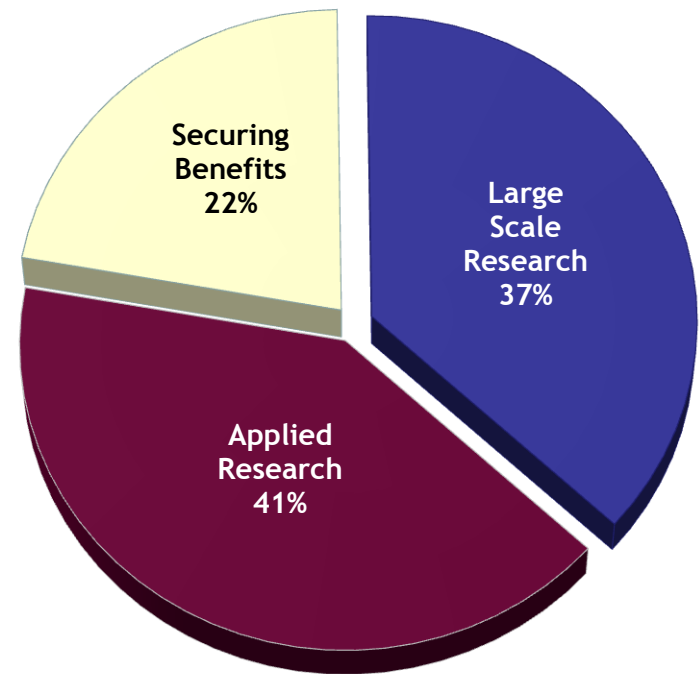


A Growing Emphasis on Translational Research Leading to Sector Specific Use

2005-2010 Plan



2010-2015 Plan



Feedstocks: Conversion to Biofuels

- Industrial-scale development of liquid biofuels will require the cultivation and processing of immense amounts of biomass from a wide variety of feedstocks
- To be economically viable and socially acceptable, these feedstock crops must:
 - 1) have very high yields
 - 2) require very little external inputs (fertilizer, water)
 - 3) grow on marginal or non-arable land
 - 4) not be a food crop or compete with the growing of existing food crops
- Conversion will include microbial, biochemical, and chemical processes derived from new knowledge of biological systems and their industrialization

Genomics - Why Now?

- DNA sequencing

- The sequencing of the human genome has revolutionized the manner in which the functionality of living organisms is analyzed
- Complete genomes of hundreds of different organisms from microbes to flies to trees to fish have now been elucidated using technologies of increasing power and decreasing cost

Comparable progress has been made in our understanding of the full complement of proteins and metabolites of cells giving rise to the fields of proteomics and metabolomics

Applications of “-omics” to Biofuels

Developing Feedstocks with Lower Environmental Footprint

- Non-arable and marginal land or brackish water
- Utilization of surplus waste streams and/or CO₂ emissions
- Reduced inputs - water, fertilizer, pesticides

Improving Biomass Traits and Novel Feedstocks

- Very high yields
- Increasing production of required metabolites (sugars, lipids)
- Traits for improved downstream processing

Increasing Processing Efficiency

- Discovery and optimization of enzymes and pathways for production
- Development of systems for combined bioprocessing (e.g. microbial)
- Synthetic biology for novel production systems (e.g. algae)

Genome BC Bioenergy Investment

Projects to date: 6

Total project value: \$27M+

Co-funders:

- Genome Canada
- Novozymes
- EU Framework 7
- US Department of Energy
- Genome Alberta
- US Department of Agriculture
- NSERC Canada
- Oak Ridge Labs Bioenergy Science Center
- National Science Foundation (US)
- INRA - France
- Joint Genome Institute

Genome BC's Applied Genomics Innovation Program (AGIP)

- Dr. Jack Saddler
 - *Optimizing Ethanol Fermentation from Mountain Pine Beetle Killed Lodgepole Pine*
- Dr. Carl Douglas and Dr. Shawn Mansfield
 - *Optimized Populus Feedstocks and Novel Enzyme Systems for a British Columbia Bioenergy Sector*





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