

CO-LABS ECONOMIC IMPACT STUDY

The Impact of Federally Funded Research Laboratories in Colorado

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Conducted for:
CO-LABS



Research by:
Business Research Division
Leeds School of Business
University of Colorado at Boulder



CO-LABS

CO-LABS is a consortium of federally funded scientific laboratories, universities, businesses, local governments, and legislators organized to establish Colorado as a global leader in research, technology, and technology transfer. The nonprofit organization:

- Collects and analyzes data to understand the scientific and economic value of the federally funded laboratories in Colorado
- Informs the public about the Labs, what they do, and their scientific and economic value
- Facilitates interactions among Colorado's federally-funded laboratories, research universities and businesses, thereby enhancing the potential for new partnerships, technology transfer and jobs

Purpose of the Study

As part of its mission to analyze the economic value of federally funded laboratories in Colorado and inform the public about their value, CO-LABS commissioned the Leeds School Business Research Division to conduct a comprehensive study measuring the economic, fiscal, and intangible impacts of CO-LABS research facilities located in Colorado, as well as their university affiliates, for fiscal years 2007, 2008, and 2009.

The study examined Colorado's federal research facilities and jointly managed federal-university partnership facilities that receive a majority of their operating budgets from the federal government. Economic and fiscal impacts are reported for the state of Colorado, the Denver metro region, and each of the three primary counties where the Labs are located.

The facilities studied include:

- Centers for Disease Control and Prevention (CDC/DVBID)
- Cooperative Institute for Research in Environmental Sciences (CIRES)
- Cooperative Institute for Research in the Atmosphere (CIRA)
- JILA
- National Oceanic and Atmospheric Administration (NOAA)
 - Earth System Research Laboratory (ESRL)
 - National Geophysical Data Center NGDC
 - National Weather Service (NWS)
 - National Environmental Satellite, Data, and Information Service (NESDIS)
 - Space Weather Prediction Center (SWPC)
- National Institute of Standards and Technology (NIST)
- National Renewable Energy Laboratory (NREL)
- National Telecommunications and Information Administration (NTIA)
- University Corporation for Atmospheric Research (UCAR)
 - National Center for Atmospheric Research (NCAR)
- U.S. Department of Agriculture - Agricultural Research Service (ARS)
 - Natural Resources Research Center
 - National Center for Genetic Resources Preservation
 - Crops Research Laboratory
 - Central Great Plains Research Station
- U.S. Department of Agriculture – Rocky Mountain Research Station (RMRS)
- U.S. Department of Agriculture – National Wildlife Research Center (NWRC)
- U.S. Geological Survey (USGS)

Impacts of Colorado Federal Research Labs and Joint Lab-University Research Facilities

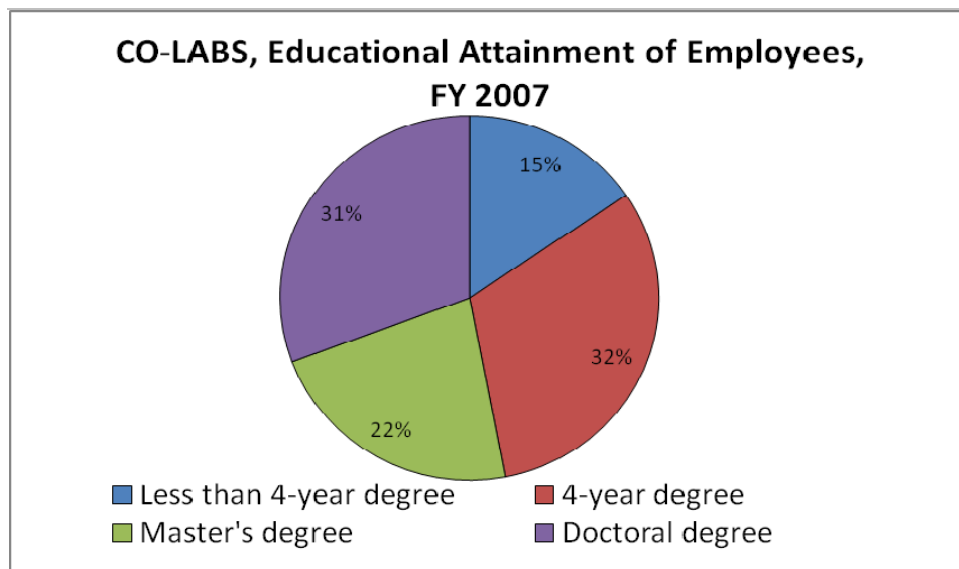
In FY 2007, CO-LABS facilities employed 5,237 full-time employees, 695 part-time employees, and 626 contract workers for a total FTE total of 6,210.5 employees.¹ Commensurate with the high number of doctorates and graduate degrees, weighted average salary and benefits totaled \$90,627 across all facilities, of which average salaries were estimated at \$64,350.

Facilities occupied 4.7 million square feet of leased and owned real estate in FY 2007, and total facility expenditures reported from the primary facilities totaled \$808.5 million. Expenditures were buoyed by construction, which topped \$12 million in FY 2007 net of land expenses, and construction budgets are slated to increase to \$54.7 million in FY 2008 and \$155.4 million in FY 2009.

CO-LABS facilities reported a total of 16,408 overnight professional visitors in FY 2007 for the purposes of attending conferences, presentations, technical training, meetings, and tours; participating in fact-finding missions and focus groups; and receiving awards. These individuals stayed an average of 2.4 nights. Day visitors totaled 103,935.

Overall, CO-LABS employees are a highly educated group, with 53% having attained a master's or doctoral degree, and 32% having attained a 4-year degree. Comparing this to all Colorado residents, 9.9% have attained a graduate or professional degree and 17.1% a bachelor's degree. This is expected as high levels of knowledge and training are often necessary to perform the work and conduct research in these industries. (See Figure 1)

Figure 1: Educational Attainment of CO-LABS Employees, FY 2007



¹Part-time workers were counted as one-half FTE.

Impact on Colorado

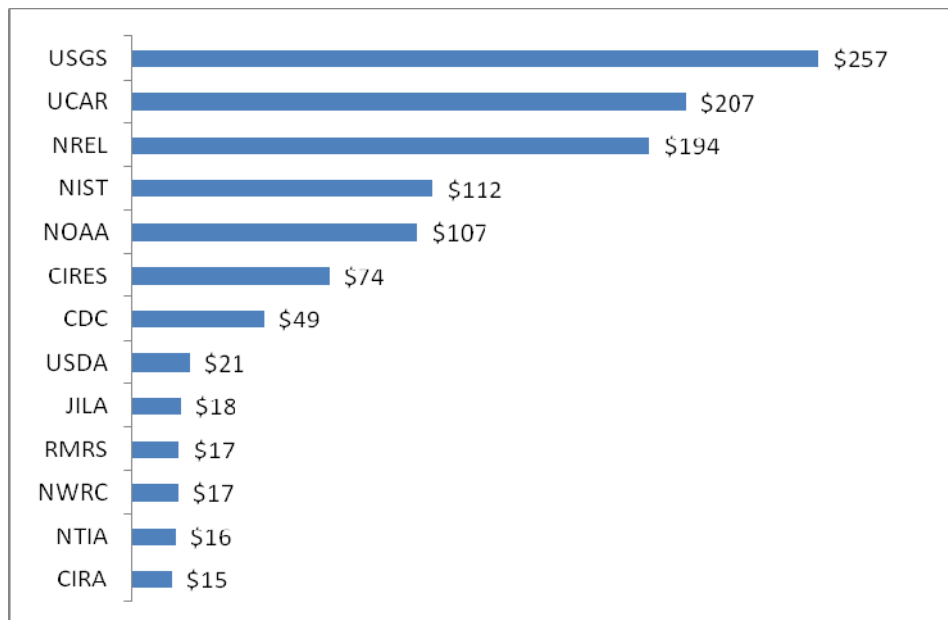
The net economic benefit of federal research facilities and their university affiliates on the state of Colorado totaled \$1.11 billion in FY 2007 (Table 1). In FY 2008 and FY 2009, the facilities are projected to have an impact on the state of \$1.25 billion and \$1.55 billion, respectively, with the largest year-over-year increase expected from construction-related activities. The greatest impact is derived from facility operations, with employee off-site expenditures and secondary impacts also accounting for substantial impacts. Together, the facilities expect moderate increases of 3.3% in employment in both FY 2008 and FY 2009, with some individual facilities anticipating decreases through attrition. Overnight visitors to the facilities accounted for \$9.5 million of the total impact in FY 2007.

Table 1: Net Economic Benefit to Colorado, in millions

Source	FY 2007	FY 2008	FY 2009
Construction	\$10.0	\$54.2	\$182.0
Operations	697.5	739.9	783.0
Employees (off-site)	136.9	147.5	158.4
Indirect	251.2	299.3	420.6
Visitors	9.5	9.8	10.1
Net Economic Benefit	\$1,105.1	\$1,250.7	\$1,554.2

Net economic benefits varied widely between facilities. At \$257 million, the USGS had the largest economic impact on the state in FY 2007, buoyed by higher percentages of in-state spending and a large number of employees. In terms of impact on the state, the top five facilities accounted for nearly 80% of the net economic benefit to Colorado. CIRA, at \$15 million, had the smallest economic impact of the studied facilities in FY 2007, albeit quite significant. (See Figure 2)

Figure 2: Net Economic Benefit to Colorado, by Facility, in millions, FY 2007



Intangible Benefits

Beyond their measurable economic impact, the federal facilities create a number of intangible benefits for their local communities, the state, and broader social structures in general. Together, the facilities surveyed donated nearly \$600,000 to the Combined Federal Campaign (CRC) and other local charitable organizations during FY 2007. Contributions to these organizations were not limited to mere financial donations, however. Employees from the federal facilities spent volunteer time adopting seniors, working with the Bonfils Blood Center, assisting with food and gift drives, and providing aid to many other programs and organizations. Moreover, employees work on such community development projects as building bike paths and educating school children and the public. These projects enrich the cultural, intellectual, and social fabric of communities around the state.

Aside from work with community service organizations, Colorado's federal facilities reported being intricately tied to all levels of the education community—from kindergarten to graduate and doctoral programs. Many of the facilities provide employees with opportunities for training, scholarships, tuition reimbursement, research fellowships, post-doctoral programs, internships, work-study positions, research assistantships, tuition waivers, and more. These allow crossover and cooperation between universities and government facilities that conduct advanced research. These collaborations improve and develop intellectual capital and research potential.

The federal research labs in Colorado maintain extensive alliances with other research institutions within the state, across the nation, and around the globe. These institutions include industry organizations, nonprofits, federal agencies and programs, large and small private research companies, and well over 100 universities across the country. Research and development has led to the transfer of technologies, creating numerous direct and indirect private companies (Table 2). In addition, firms including ConocoPhillips, Vestas Americas, and Renewable Energy Systems Americas, are investing in Colorado in order to benefit from the research and development taking place in the state, as well as the well-educated labor force.

These facilities bring high-level recognition to the state in the form of more than ten Presidential Rank awards, multiple Nobel Prizes in physics, a host of government agency awards and teaching awards, as well as innovation awards. Indeed, several employees from four of Colorado's federal labs were honored with a share in the 2007 Nobel Peace Prize for their contributions to the Intergovernmental Panel on Climate Change's (IPCC) 2007 assessment report.

Table 2: A Sample of Companies Spawnd from Federal Research Facilities

STAR Institute	AlphaSniffer
Advanced Radar Corporation	Vescent Photonics
Peak Weather Resources	Precision Technologies
WITI Corporation	Global Solar
Micro-G Solutions	Ascent Solar
Winters Electro-Optics	PrimeStar Solar
HelioVolt	Skyfuel
ColdQuanta	

Impact on Boulder County

Boulder County facilities account for 47.5% of Colorado's CO-LABS employment, and the county is residence to 41.3% of CO-LABS employees. The net economic benefit of federal research facilities and their affiliates on Boulder County totaled \$376.7 million in FY 2007 (Table 3). In FY 2008 and FY 2009, the facilities are expected to have an impact on Boulder County of \$432.9 million and \$496.6 million, respectively. Employment is anticipated to increase 2.4% each year, while construction will climb from \$1.3 million in FY 2007 to \$17.5 million in FY 2008 and \$45.8 million in FY 2009.

Table 3: CO-LABS, Net Economic Benefit to Boulder County, in millions

Source	FY 2007	FY 2008	FY 2009
Construction	\$1.3	\$17.5	\$45.8
Operations	268.5	281.5	294.4
Employees (off-site)	58.6	61.8	64.9
Indirect	46.6	70.4	89.7
Visitors	1.7	1.7	1.8
Net Economic Benefit	\$376.7	\$432.9	\$496.6

UCAR accounted for more than 43% of federal research employment and 42% of economic impact, making it the largest of the studied facilities in Boulder County. The net economic impact on Boulder County topped \$147.5 million in FY 2007. (See Table 4)

Table 4: Net Economic Benefit to Boulder County and Colorado, in millions, FY 2007

Facility	Boulder County	Colorado
CIRES	\$40.9	\$73.6
JILA	13.3	18.0
NIST	70.8	112.4
NOAA	66.1	106.7
NTIA	10.9	16.1
UCAR	147.5	207.4

Construction at facilities in Boulder County in FY 2007, FY 2008, and FY 2009 are limited to NIST, NOAA, and NTIA. NIST is building a new research and development laboratory, spending \$10.1 million in FY 2007, and budgeting \$23.6 million and \$43.5 million in FY 2008 and FY 2009. NOAA spent \$1.1 million in FY 2007 installing new fire suppression systems, reducing dependence on emergency power generation, and making IT-related renovations. Construction expenditures at NOAA are expected to total \$1.3 million in FY 2008 and \$650,000 in FY 2009. NTIA spent \$250,000 in FY 2007 to upgrade the Table Mountain Research site by improving and maintaining roads, buildings, and security. The facility plans similar construction-related expenditures over the next two years.

Impact on Jefferson County

Jefferson County employees account for 39.5% of Colorado's CO-LABS employment, and the county is residence to 25.1% of CO-LABS employees. The net economic benefit of federal research facilities and their affiliates on Jefferson County totaled \$363.5 million in FY 2007 (Table 5). In FY 2008 and FY 2009, the facilities are expected to have an impact on Jefferson County of \$419.8 million and \$509.1 million, respectively. Employment is anticipated to increase 5.7% each year, and construction is expect to grow from \$247,000 in FY 2007 to \$16.3 million in FY 2008 and \$48.8 million in FY 2009.

Table 5: CO-LABS, Net Economic Benefit to Jefferson County, in millions

Source	FY 2007	FY 2008	FY 2009
Construction	\$0.2	\$16.3	\$48.8
Operations	226.7	236.6	257.5
Employees (off-site)	66.1	69.5	78.3
Indirect	66.5	93.3	120.3
Visitors	4.0	4.1	4.2
Net Economic Benefit	\$363.5	\$419.8	\$509.1

The USGS accounted for nearly 59% of federal research employment and 60% of the economic impact, with the remainder attributable to NREL. The net economic impact of USGS and NREL on Jefferson County totaled \$189.5 million and \$123.9 million in FY 2007, respectively (Table 6).

Table 6: Net Economic Benefit to Jefferson County and Colorado, in millions, FY 2007

Facility	Jefferson County	Colorado
NREL	\$123.9	\$194.0
USGS	\$189.5	\$257.0

While USGS reported nearly \$168,000 in construction expenditures in FY 2007 for office alterations, the bulk of construction at Jefferson County's research facilities will be attributable to NREL in over the next two years. The facility spent \$200,000 in FY 2007, and has \$25 million and \$75 million budgeted for FY 2008 and FY 2009 for the construction of a research support facility and an integrated biorefinery research facility.

Impact on Larimer County

Larimer County employees account for 12.9% of Colorado's CO-LABS employment, and the county is residence to 12.2% of CO-LABS employees. The net economic benefit of federal research facilities and their affiliates on Larimer County totaled \$105.8 million in FY 2007 (Table 7). In FY 2008 and FY 2009, the facilities are expected to have an impact on Larimer County of \$113.1 million and \$152.2 million, respectively. Employment is expected to remain nearly flat each year, and construction impacts are expected to increase from \$131,000 in FY 2007 to \$3.1 million in FY 2008 and \$25.0 million in FY 2009.

Table 7: CO-LABS, Net Economic Benefit to Larimer County, in millions

Source	FY 2007	FY 2008	FY 2009
Construction	\$0.1	\$3.1	\$25.0
Operations	72.9	74.4	77.0
Employees (off-site)	16.5	16.8	17.3
Indirect	15.5	18.0	32.1
Visitors	0.7	0.7	0.7
Net Economic Benefit	\$105.8	\$113.1	\$152.2

The CDC is the largest federal research facility in Larimer County, accounting for 29% of federal research employment and more than 37% of the economic impact. The net economic impact of the facility topped \$30.6 million in FY 2007 (Table 6).

Table 8: Net Economic Benefit to Larimer County and Colorado, in millions, FY 2007

Facility	Larimer County	Colorado
CDC	\$30.6	\$49.4
CIRA	9.5	14.8
NWRC	10.8	17.1
RMRS	14.0	17.3
USDA	17.0	21.4

There was a minimal amount of construction at Larimer County facilities in FY 2007, limited to improving and modifying facilities at the USDA-ARS and completing an interior remodeling project at CIRA. However, the RMRS has budgeted \$3.9 million for an addition to their facility adding new laboratories in FY 2008, and the NWRC has budgeted \$650,000 in FY 2008 for a guard house and guard stand and \$36.0 million in FY 2009 for a wildlife disease research building.

Impact on Denver Metro Region

The Denver Metro region is comprised of Adams, Arapahoe, Broomfield, Denver, Douglas, and Jefferson counties. Denver Metro employment at federal research labs is therefore limited to those working in Jefferson County, and thus accounts for 39.5% of Colorado's CO-LABS employment. However, the Denver Metro region benefits from employees who live within the seven county region and commute to work at all facilities, and 12.2% of CO-LABS employees live in these Denver Metro counties.

The net economic benefit of federal research facilities and their affiliates on Denver Metro region totaled \$490.6 million in FY 2007 (Table 9). In FY 2008 and FY 2009, the facilities are expected to have an impact on the Denver Metro region of \$552.6 million and \$648.5 million, respectively. Employment is expected to increase 5.7% year-over-year, and construction impacts are expect to grow from \$153,000 in FY 2007 to \$17.5 million in FY 2008 and \$52.6 million in FY 2009.

Table 9: CO-LABS, Net Economic Benefit to the Denver Metro Region, in millions

Source	FY 2007	FY 2008	FY 2009
Construction	\$0.2	\$17.5	\$52.6
Operations	313.9	336.1	359.6
Employees (off-site)	51.3	55.6	60.5
Indirect	122.2	140.3	172.5
Visitors	3.0	3.0	3.1
Net Economic Benefit	\$490.6	\$552.6	\$648.5

For more information about CO-LABS or to obtain a PDF copy of the full report, contact DeAnne Butterfield, CO-LABS Executive Director, at 303.938.2082 or DeAnne@co-labs.org. You can reach Brian Lewandowski, principal researcher, at the Leeds School Business Research Division at 303.492.3307 or Brian.Lewandowski@Colorado.EDU.