

Economic Impact
of the
Installation and Operation of the
Proposed Medium Energy Electron Ion Collider (MEIC)
at the
Thomas Jefferson National Accelerator Facility

January 2014

Prepared for
Jefferson Science Associates

Prepared by
The Wessex Group, Ltd.
479 McLaw's Circle, Suite 1
Williamsburg, Virginia 23185
Telephone: 757.253.5606
wessexgroup@wessexgroup.com
www.wessexgroup.com

**Economic Impact of the Installation and Operation
of the Proposed Medium Energy Electron Ion Collider (MEIC)
at the
Thomas Jefferson National Accelerator Facility**

EXECUTIVE SUMMARY

With a history that traces from the 1970's, The **Thomas Jefferson National Accelerator Facility** (Jefferson Lab or TJNAF) today is a world-class nuclear physics research center managed and operated by **Jefferson Science Associates** (JSA) for the Department of Energy (DOE). In keeping with this distinguished history, **Jefferson Laboratory** (Jefferson Lab or JLab) is positioning itself to compete for the addition of a new Medium Energy Electron Ion Collider (MEIC) on the Jefferson Lab site operating in an energy range up to 65 GeV and at a projected construction cost of \$618.8 million. The next big goal of nuclear science is to understand the structure and interactions of the quarks and gluons within the protons and neutrons in atomic nuclei. Testing theory and probing deeper into the structure of atoms requires access to new experimental facilities, in this case the medium energy electron-ion collider (MEIC). If the Department of Energy decides, in 2015, to go forward with building an MEIC as the initial phase to achieve these scientific goals, then the Thomas Jefferson National Accelerator Facility in Newport News will be one of only two (2) potential sites competing for the contract award. Future envisioned up-upgrades to the MEIC, costing an additional several hundred million dollars, could bring the collider's energy range to 150 GeV or greater, positioning it for future scientific contributions to the Commonwealth,, the nation, and the field of nuclear physics worldwide.

While a scientific gem, Jefferson Laboratory also is a huge economic engine for the local community, the Commonwealth and the nation. The purpose of this report is to document the economic benefits to the **Commonwealth of Virginia** and to the **Hampton Roads** area that are expected to be derived by installation of the proposed new MEIC collider. Jefferson Lab's economic benefits, while impressive in scope are, nevertheless, limited by the measuring instrument used for the analysis, money. The intellectual and scientific benefits facilitated by Jefferson Lab through the research it supports, ultimately, are very likely to eclipse the immediate and measurable monetary benefits from the new collider's installation in Newport News. Further, if Jefferson Lab is to sustain its intellectual and research contribution to the nation, the Commonwealth of Virginia and Hampton Roads, it also must operate with the most sophisticated technology available, such as the proposed MEIC. This report, prepared with inputs from TJNAF, provides estimates of the Virginia and Hampton Roads economic impacts that would flow from building and operating the MEIC at TJNAF. TJNAF proposes a phased approach to the installation and operation of the new collider, initially building a polarized Medium-energy Electron-Ion Collider (MEIC), operating in an energy range up to 65 GeV, at a cost of \$618.8 million. A future energy upgrade, possibly costing several hundred million dollars, could increase the energy range to 150 GeV or above.

Southeastern Universities Research Association (SURA), the majority member of **JSA**, commissioned **The Wessex Group, Ltd.** to prepare an assessment of the economic benefits that the **Commonwealth of Virginia** and the **Hampton Roads** metropolitan area could derive from the construction and operation of the proposed electron-ion collider.

Economic Impact of the Construction and Operation of the Proposed MEIC

The installation of the proposed MEIC at Jefferson Lab, is expected to generate both immediate construction economic benefits and longer-term operating economic benefits. Construction is assumed to begin in 2016 with completion in 2026. The cumulative economic impact estimates from the construction activity are shown below and summarized in the following.

- For the **Commonwealth of Virginia**, **\$708.1 million** in spending and **4,974 jobs**.
- For the **Hampton Roads** area **\$556.7 million** in spending and **4,050 jobs**.

The economic benefits to the region and state potentially created by the **operation** of the proposed MEIC at Jefferson Lab primarily will derive from three sources:

- the direct spending by the lab and by its contractors on the new collider's operation, and spending by visiting scientists using the facility, about seventy-five percent of whom will be from other countries, while in Hampton Roads.
- the extraordinary intellectual benefits derived by regional and national research institutions, colleges, and schools who obtain access to Jefferson Laboratory's new capabilities and discoveries. While these benefits may eventually over-shadow the financial benefits, they are not directly measured by this analysis.
- the application (for both scientific and commercial purposes) of the collider's findings and insight it provides to the community and world. Again, while these later benefits are certain to follow in the long run and to far out-weigh the immediate economic benefits of the collider's acquisition and installation, they also are not measured by this analysis.

Further, in the long-run, and perhaps of even greater significance, especially to the Commonwealth of Virginia and to the Hampton Roads area is that addition of the new MEIC to Jefferson Lab's capabilities is expected to insure its continuation as one of the leading sources of scientific research in the nation. And, because the installation will insure Jefferson Lab's position in the nation's scientific research endeavors, both the Commonwealth and regional area will directly benefit from the capability and support that Jefferson Lab is able to provide to the higher education institutions within in the Commonwealth and nation.

Economic Impact of the Acquisition, Construction and Initial Operation of the Electron Ion Collider at the Thomas Jefferson National Accelerator Facility.

The **\$618.8** million investment in extending Jefferson Lab's capabilities with the construction and installation of a **Medium Energy Electron Ion Collider** (MEIC) will create an incremental economic impact for the...

- **Commonwealth of Virginia** in the cumulative amount over 7 to 10 years of **\$708.1** million funding **4,974** jobs representing **\$401.9** million in labor income.
- **Hampton Roads area** in the cumulative amount of **\$556.7** million including the creation of **4,050 jobs** generating labor income in the amount of **\$310.1** million.

MEIC operations are expected to grow over a five (5) year period as the construction is completed. TJNAF expects the cost of operating the collider in the first year to be **\$44.0 million** (at 2013 prices), as shown in Table A following. Indirect and induced spending produced at other Virginia businesses will bring the total operations-related spending to an estimated **\$71.6** million. Direct Virginia labor income is expected to be **\$35.1 million**, received by **276** workers. Another **\$9.3** million in labor income will be earned in supporting sectors, paid to approximately **211** workers. In total, **487** jobs will be directly and indirectly dependent on the **MEIC** first-year operations. State sales taxes generated that year are expected to be **\$549,000** in **Virginia** general sales taxes, and state income taxes of **\$978,000** yielding a combined total of **\$1.5 million**.

Table A
Virginia First Year MEIC Operations Impacts
By Expenditure Category (\$ Millions at 2013 prices)

Impact Type	Direct Effect	Indirect & Induced Effects	Total Effect
Virginia Spending	\$ 44.0	\$ 27.6	\$ 71.6
Virginia Value Added	\$ 39.5	\$ 16.9	\$ 56.4
Virginia Labor Income	\$ 35.1	\$ 9.3	\$ 44.4
Virginia Jobs	276	211	487

MEIC operations are expected to expand steadily over the following four (4) years, with direct operating expenditures rising to \$60.0 million in Year 2, \$75.0 million in Year 3, \$90.0 million in Year 4, and reaching \$110.0 million in Year 5.

Table B (below) shows the projected Year 5 MEIC operating impacts. At its full operating level, the MEIC is expected to be the source for \$179.1 million in Virginia spending, of which \$140.9 million will be for goods and services made in **Virginia** and funding \$111.1 million in labor income earned annually by 1,216 workers. MEIC operations are expected to be responsible for \$1.4 million in **Virginia** general sales taxes and \$2.4 million in state personal and corporate income taxes that year, for a combined \$3.8 million. These impacts illustrate the expected continuing impacts expected annually from operating this major nuclear research facility.

Table B
Commonwealth of Virginia Year 5 MEIC Operations Impacts
 (\$ Millions, at 2013 Prices)

Impact Type	Direct Effect	Indirect & Induced Effects	Total Effect
Virginia Spending	\$ 110.1	\$ 69.0	\$ 179.1
Virginia Value Added	\$ 98.7	\$ 42.2	\$ 140.9
Virginia Labor Income	\$ 87.9	\$ 23.2	\$ 111.1
Virginia Jobs	690	527	1,216

In addition to the direct economic benefits that will flow from the Electron Ion Collider’s installation and initial operation it also will insure that the **Thomas Jefferson National Accelerator Facility**, already a major economic engine for the region, state and nation, will continue its leadership role in the exploration of the physics of the basic building blocks of the atom, and the advancement of the nation’s scientific knowledge for many years to come.