

**WESTERN UNIVERSITY**

**CONSERVATION AND DEMAND MANAGEMENT PLAN 2014-2019**

**I. Annual Energy Consumption (May 2012 – April 2013)**

A summary of Western's energy use in the applicable spaces, as per Ontario Regulation 397/11, is presented in the next two pages. The complete template and data submitted to the Ministry of Energy is available electronically on Western's Energy Dashboard ([energy.uwo.ca](http://energy.uwo.ca)) and in paper at Facilities Development & Engineering (Support Services Building, Room 2350).

**WESTERN UNIVERSITY - ENERGY USE**  
**May 2012 - April 2013**

Operation Name	Operation Type	Total Floor Area	Unit	Energy Type and Amount Purchased and Consumed in Natural Units					
				Electricity		Natural Gas		Fuel Oil 1 & 2	
				Quantity	Unit	Quantity	Unit	Quantity	Unit
Central Campus	Administrative Offices and related facilities	701361.40	Square feet	7775947.97	kWh	1710954.44	Cubic meter	156.49	L
Central Campus	Classrooms and related facilities	312759.10	Square feet	4871743.35	kWh	1071937.58	Cubic meter	69.78	L
Central Campus	Laboratories	774817.70	Square feet	24990062.73	kWh	5498604.01	Cubic meter	172.88	L
Central Campus	Student residences	365466.20	Square feet	5625772.36	kWh	1237847.81	Cubic meter	81.54	L
Central Campus	Student recreational facilities and athletic facilities	364413.70	Square feet	7362534.71	kWh	1619990.44	Cubic meter	81.31	L
Central Campus	Library	271629.90	Square feet	3783074.67	kWh	832396.05	Cubic meter	60.61	L
Advanced Facility for Avian Research	Administrative Offices and related facilities	1671.60	Square feet	28969.36	kWh	5880.75	Cubic meter		
Advanced Facility for Avian Research	Laboratories	7468.50	Square feet	376527.05	kWh	76434.56	Cubic meter		
Althouse College	Administrative Offices and related facilities	31493.30	Square feet	258844.37	kWh	41775.81	Cubic meter		
Althouse College	Classrooms and related facilities	20970.70	Square feet	242156.68	kWh	39082.53	Cubic meter		
Althouse College	Laboratories	21997.90	Square feet	349647.69	kWh	56430.89	Cubic meter		
Althouse College	Student recreational facilities and athletic facilities	8388.40	Square feet	125637.96	kWh	20277.16	Cubic meter		
Althouse College	Library	8683.5	Square feet	89654.32	kWh	14469.63	Cubic meter		
Ausable Hall Residence	Student residences	35011	Square feet	240422.60	kWh	98156.00	Cubic meter		
Bayfield Hall Residence	Student residences	171568.5	Square feet	933143.18	kWh	333026.02	Cubic meter		
Beaver Hall Residence	Student residences	43548.7	Square feet	329421.36	kWh	97064.49	Cubic meter		
Elborn College	Administrative offices and related facilities	26579.5	Square feet	234982.97	kWh	4459.13	Cubic meter		
Elborn College	Classrooms and related facilities	18041.9	Square feet	224096.36	kWh	4252.55	Cubic meter		
Elborn College	Laboratories	29515.1	Square feet	504617.98	kWh	9575.84	Cubic meter		
Elborn College	Student recreational facilities and athletic facilities	1848.3	Square feet	29777.16	kWh	565.06	Cubic meter		
Elborn College	Library	13645.7	Square feet	151544.87	kWh	2875.78	Cubic meter		
Essex Hall Residence	Student residences	136910.5	Square feet	1372034.84	kWh	378648.30	Cubic meter		
Essex Hall Residence	Student recreational facilities and athletic facilities	5657.7	Square feet	74415.95	kWh	20536.99	Cubic meter		
Fraunhofer Project Centre	Administrative Offices and related facilities	122.3	Square feet	215.60	kWh	55.40	Cubic meter		
Fraunhofer Project Centre	Laboratories	10754.1	Square feet	55152.19	kWh	14170.60	Cubic meter		
Graphics Building	Administrative offices and related facilities	10720.8	Square feet	124561.52	kWh	19950.40	Cubic meter		
Harold W Siebens Centre	Administrative offices and related facilities	12484.7	Square feet	358432.36	kWh	433.03	Cubic meter		
Harold W Siebens Centre	Laboratories	31537.90	Square feet	2634014.77	kWh	3182.24	Cubic meter		
ICFAR / Environmental Sciences West	Administrative offices and related facilities	6764.60	Square feet	58983.85	kWh	6818.44	Cubic meter		
ICFAR / Environmental Sciences West	Laboratories	16007.80	Square feet	406049.47	kWh	46938.66	Cubic meter		
Lambton Hall Residence	Student residences	107016.10	Square feet	448810.03	kWh	145810.93	Cubic meter		
London Hall Residence	Administrative offices and related facilities	662.40	Square feet	6637.26	kWh	776.74	Cubic meter		
London Hall Residence	Student residences	119878.10	Square feet	1667753.36	kWh	195172.55	Cubic meter		
London Hall Residence	Student recreational facilities and athletic facilities	1146.40	Square feet	20932.73	kWh	2449.70	Cubic meter		
Museum of Ontario Archaeology	Administrative Offices and related facilities	2900.50	Square feet	13874.64	kWh	2444.73	Cubic meter		
Museum of Ontario Archaeology	Classrooms and related facilities	20744.30	Square feet	139415.32	kWh	24565.14	Cubic meter		
Perth Hall Residence	Student residences	97303.20	Square feet	2018250.60	kWh	0.00	Cubic meter		
Perth Hall Residence	Student recreational facilities and athletic facilities	7532.30	Square feet	205056.39	kWh	0.00	Cubic meter		

Platts Lane Apartments	Student residences	377182.40	Square feet	724338.95	kWh	262401.72	Cubic meter		
Richard Ivey School of Business (New)	Administrative Offices and related facilities	75296.30	Square feet	326241.41	kWh	88477.32	Cubic meter		
Richard Ivey School of Business (New)	Classrooms and related facilities	37271.50	Square feet	226884.74	kWh	61531.59	Cubic meter		
Richard Ivey School of Business (New)	Laboratories	589.50	Square feet	4939.44	kWh	1339.59	Cubic meter		
Richard Ivey School of Business (New)	Student recreational facilities and athletic facilities	24189.60	Square feet	190992.06	kWh	51797.43	Cubic meter		
Richard Ivey School of Business (New)	Library	13776.80	Square feet	74984.18	kWh	20335.86	Cubic meter		
Robarts Research Institute	Administrative Offices and related facilities	52495.20	Square feet	1431136.74	kWh	1079.77	Cubic meter		
Robarts Research Institute	Laboratories	64267.10	Square feet	5096905.31	kWh	3845.54	Cubic meter		
Saugeen-Matiland Hall Residence	Administrative Offices and related facilities	779.20	Square feet	5868.51	kWh	1201.47	Cubic meter		
Saugeen-Matiland Hall Residence	Student residences	176623.10	Square feet	1846926.18	kWh	378124.41	Cubic meter		
Saugeen-Matiland Hall Residence	Student recreational facilities and athletic facilities	15147.30	Square feet	207890.66	kWh	42561.82	Cubic meter		
Spencer Hall	Administrative Offices and related facilities	21264.20	Square feet	292626.45	kWh	32744.04	Cubic meter		
Spencer Hall	Classrooms and related facilities	9457.70	Square feet	182857.60	kWh	20461.23	Cubic meter		
Spencer Hall	Student recreational facilities and athletic facilities	8590.70	Square feet	215434.00	kWh	24106.43	Cubic meter		
Support Services Building	Administrative Offices and related facilities	88249.30	Square feet	2674158.95	kWh	58146.29	Cubic meter		
Support Services Building	Student recreational facilities and athletic facilities	1259.20	Square feet	69533.14	kWh	1511.91	Cubic meter		
TD Waterhouse Stadium	Administrative Offices and related facilities	3326.30	Square feet	35881.82	kWh	2955.62	Cubic meter		
TD Waterhouse Stadium	Student recreational facilities and athletic facilities	16341.30	Square feet	321233.48	kWh	26460.30	Cubic meter		
The Insurance Research Lab for Better	Administrative Offices and related facilities	328.00	Square feet	2395.31	kWh	0.00	Cubic meter		
The Insurance Research Lab for Better	Laboratories	4778.20	Square feet	67480.90	kWh	0.00	Cubic meter		
Westminster Hall	Administrative Offices and related facilities	32062.30	Square feet	500467.80	kWh	53799.64	Cubic meter		
Westminster Hall	Classrooms and related facilities	1005.40	Square feet	22048.72	kWh	2370.21	Cubic meter		
Westminster Hall	Laboratories	9893.90	Square feet	298660.56	kWh	32105.62	Cubic meter		
Westminster Hall	Student recreational facilities and athletic facilities	267.40	Square feet	7606.14	kWh	817.65	Cubic meter		
Westminster Site 357	Administrative Offices and related facilities	813.70	Square feet	4450.27	kWh	0.00	Cubic meter		
Westminster Site 357	Laboratories	758.20	Square feet	8019.27	kWh	0.00	Cubic meter		
Westminster Site 363	Administrative Offices and related facilities	1360.80	Square feet	9610.40	kWh	0.00	Cubic meter		
Westminster Site 363	Laboratories	556.20	Square feet	7596.38	kWh	0.00	Cubic meter		
Westminster Site 367	Administrative Offices and related facilities	1991.30	Square feet	21308.50	kWh	0.00	Cubic meter		

## II. Energy Conservation Goals

- Achieve a 9% reduction in energy use intensity [ekWh/m<sup>2</sup>] below 2012's levels
- Reduce overall energy use by 4% below 2012's use
- Reduce direct greenhouse gas emissions below 2009 baseline
- Reduce water use intensity [m<sup>3</sup>/m<sup>2</sup>] by 8% below 2012's levels

## III. Proposed Measures

The following measures presented under this section have been identified by consultants and/or Western's representatives. The actual scope and implementation of each measure will be assessed on a year-by-year basis, based on: Annual budgets, significance of the energy and costs savings, non-monetary benefits resulting from the measure (e.g., productivity, sustainability, research outcomes), and technical feasibility.

Once the measures are scoped, studies will be conducted to confirm that each measure (as applicable to each building, system or space) is pertinent, meets or surpasses the specific performance needs and has an attractive return (e.g., IRR, simple payback, NPV). Scoped measures that don't meet these criteria will not be implemented.

1. **Organizational Measure:** Energy and water efficiency and conservation shall be an integral part of all major construction and renovation projects and these components will not be part of value engineering efforts.
  - Estimated cost<sup>1</sup>: 1.8% additional to the baseline project budget
  - Estimated savings<sup>2</sup>: 20% in annual operating costs
  - Length of time the measure will be in place: Indefinitely
2. **Organizational Measure:** Best efforts should be made to undertake design and construction at a level to achieve a minimum of LEED silver certification, noting there may be renovation projects where this is not achievable without significant additional expenditures. In this case, the Vice-President (Resources & Operations) shall have the final recommendation. This statement does not mean that formal certification will be sought.
  - Estimated cost<sup>1</sup>: 1.8% additional to the baseline project budget
  - Estimated savings<sup>2</sup>: 20% in annual operating costs
  - Length of time the measure will be in place: Indefinitely

3. **Behavioural Measure:** Develop and enhance training and education programs for students, faculty and staff, oriented towards energy conservation and demand management.
  - Estimated cost<sup>1</sup>: \$50,000
  - Estimated savings<sup>2</sup>: 500,000 kWh per year
  - Length of time the measure will be in place: Ten years
  
4. **Technical Measure:** Conduct demand management activities during the summer to reduce Western's contribution to Ontario's demand.
  - Estimated cost<sup>1</sup>: \$40,000 per year
  - Estimated savings<sup>2</sup>: 1 to 4 MW reduction in Central Campus' demand
  - Length of time the measure will be in place: Five years
  
5. **Technical Measure:** Installation of steam meters in all of Central Campus' buildings. The information collected will be used for improved steam system management, business operations, preventive maintenance, research projects, awareness, building and energy management
  - Estimated cost<sup>1</sup>: \$507,000
  - Estimated savings<sup>2</sup>: 29,136,000 lbs of steam per year
  - Length of time the measure will be in place: Indefinitely
  
6. **Technical Measure:** Reduce heat losses in the steam and condensate systems through the installation of new insulation and removable covers.
  - Estimated cost<sup>1</sup> (for six buildings): \$409,000
  - Estimated savings<sup>2</sup> (for six buildings): 752,210 m<sup>3</sup> of natural gas per year
  - Length of time the measure will be in place: Indefinitely

7. **Technical Measure:** Conduct lighting retrofits in existing buildings, including: Incandescent lamp replacement, removal of remaining T12 lamps, installation of LED lights, occupancy sensors, ballast replacement and installation of T5 lamps and fixtures.
  - Estimated cost<sup>1</sup>: \$626,500
  - Estimated savings<sup>2</sup>: 738,000 kWh per year
  - Length of time the measure will be in place: Five years
  
8. **Technical Measure:** Improve weather-proofing in older buildings, focusing on entrances and exits with high-traffic where heat exchange is occurring between outdoor and indoor air.
  - Estimated cost<sup>1</sup>: \$20,000
  - Estimated savings<sup>2</sup>: 158,000 kWh per year
  - Length of time the measure will be in place: Five years
  
9. **Organizational Measure:** Work with Western's faculty and researchers in the development and implementation of research projects related to utilities management, conservation, efficiency and behavioural change.
  - Estimated cost<sup>1</sup>: \$50,000
  - Estimated savings<sup>2</sup> in projects identified to date: 14% less electrical losses in a building's distribution system, 5%-10% less energy use due to enhanced preventive maintenance in a building
  - Length of time the measure will be in place: Five years

10. **Organizational Measure:** Develop and enhance conservation initiatives that engage students, staff and faculty in energy conservation in their living/working spaces.

- Estimated cost<sup>1</sup>: \$5,000 per year
- Estimated savings<sup>2</sup>: 212,000 kWh per year
- Length of time the measure will be in place: Ten years

11. **Organizational Measure:** Develop an in-house energy dashboard with real-time energy use as well as historical data, including all of Western's buildings.

- Estimated cost<sup>1</sup>: \$75,000 per year
- Estimated savings<sup>2</sup>: 1,166,153 kWh per year
- Length of time the measure will be in place: Five years

12. **Technical Measure:** Equipment retrofits and minor construction projects will utilize energy-efficient equipment (e.g., boilers, water heaters, heat exchangers), systems (e.g., VFD-controlled motors) and designs.

- Estimated cost<sup>1</sup>: 5-15% more than a standard-efficiency unit
- Estimated savings<sup>2</sup>: Up to 38% less compared to a standard-efficiency unit (Percentage savings will vary depending on the type of unit/system)
- Length of time the measure will be in place: Indefinitely

13. **Technical Measure:** Optimization of the chilled water distribution system, by installing new valves, improving the delta T, removing unnecessary pumps and improving chilled water bridges.

- Estimated cost<sup>1</sup>: \$1,400,000
- Estimated savings<sup>2</sup>: 4,772,400 kWh per year
- Length of time the measure will be in place: Ten years

14. **Technical Measure:** Conduct ASHRAE – Level I and II audits of select buildings to identify efficiency and conservation projects.

- Estimated cost<sup>1</sup>: \$12,000 per building
- Estimated savings<sup>2</sup>: An average of 280,600 kWh per year, per building (Assuming all measures with a simple payback of 6 years or less are implemented)
- Length of time the measure will be in place: Five years

15. **Technical Measure:** Improve controls in laboratories to: Reduce air flow in fume hoods when the units are not in use, alert users of fume hoods left open, setback of the rooms' systems when unoccupied and control differential pressure more efficiently.

- Estimated cost<sup>1</sup>: \$5,700 per laboratory
- Estimated savings<sup>2</sup>: 17% less energy used per fume hood, 10% less energy used for room conditioning
- Length of time the measure will be in place: Indefinitely

## NOTES

<sup>1</sup> The costs provided are estimates based on consultants' reports, case studies (which may not always be an accurate match to Western's operations) and projects previously implemented. These costs remain vulnerable to error and subject to change due to unseen existing conditions, inflationary factors, and variations in details of the actual project scope.

<sup>2</sup> The estimated energy savings are based on consultants' reports, case studies (which may not always be an accurate match to Western's operations) and projects previously implemented and are not meant to be relied on to determine or project actual electricity or cost savings. Western doesn't warrant the accuracy, reliability, completeness or timeliness of the information presented. These estimates remain vulnerable to error and subject to change due to unseen existing conditions and variations in details of the actual project scope.

## IV. Renewable Energy Generation Facilities

Western currently doesn't have any on-site renewable energy generation facilities.

**V. Confirmation of Approval by Senior Management**

June 12, 2014

To: Ontario Ministry of Energy

I hereby confirm Western University's commitment to energy conservation and demand management will be guided by this plan for the next five years. The plan will be revised and periodically updated, in order to remain relevant and current to Western's operations.

Sincerely,



Gitta Kulczycki  
Vice-President (Resources & Operations)  
Western University