Supplementary material

Climate data for undertaking hygrothermal and whole building simulations under projected climate change influences in 11 Canadian cities

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Table S1. Climate gauging stations considered to prepare merged observational climate data for Calgary.

Climate variable (Program source-element)	Station name	Climate ID	Longitude (ºE)	Latitude (ºN)	Time-period of data collection
Global solar radiation (HLY11-061)	Lethbridge Cda*	3033890	-112.8	49.7	1989-1999
Cloud-cover (HLY01-082)	Cop Upper	3031875	-114.2	51.1	2010-2015
	Calgary Int'l A	3031093	-114.0	51.1	1986-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2008-2015
Rainfall (HLY03-123)	Calgary Int'l A	3031093	-114.0	51.1	1986-2010
	Calgary Int'l Cs	3031094	-114.0	51.1	2009-2016
Wind speed (HLY01-075) and wind direction (HLY01-156)	Calgary Int'l A	3031093	-114.0	51.1	1986-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2012-2016
Relative humidity (HLY01-080)	Calgary Int'l A	3031093	-114.0	51.1	1986-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2008-2016
Temperature (HLY01-078)	Calgary Int'l A	3031093	-114.0	51.1	1986-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2008-2016
Pressure (HLY01-077)	Calgary Int'l A	3031093	-114.0	51.1	1986-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2008-2016
Snow-depth (DLY04-013)	Cop Upper	3031875	-114.2	51.1	2010-2015
	Calgary Int'l A	3031093	-114.0	51.1	1992-2016
	Calgary Int'l Cs	3031094	-114.0	51.1	2008-2016

Table S2. Climate gauging stations considered to prepare merged observational climate data for Charlottetown.

Climate variable	Station name	Climate ID	Longitude (ºE)	Latitude (ºN)	Time-period of data collection
Global solar radiation (HLY11-061)	Charlottetown Cda	8300400	-63.1	46.3	1986-1997
Cloud-cover (HLY01-082)	Charlottetown A	8300300	-63.1	46.3	1986-2016
Rainfall (HLY03-123)	Charlottetown Cda	8300400	-63.1	46.3	1986-1990
	Charlottetown A	8300300	-63.1	46.3	2007-2016
Wind speed (HLY01-075) and wind direction (HLY01-156)	Charlottetown A	8300300	-63.1	46.3	1986-2016
Relative humidity (HLY01-080)	Charlottetown A	8300300	-63.1	46.3	1986-2016
Temperature (HLY01-078)	Charlottetown A	8300300	-63.1	46.3	1986-2016
Pressure (HLY01-077)	Charlottetown A	8300300	-63.1	46.3	1986-2016
Snow-depth (DLY04-013)	Charlottetown A	8300300	-63.1	46.3	1992-2016

Table S3. Climate gauging stations considered to prepare merged observational climate data for Halifax.

Climate variable	Station name	Climate ID	Longitude (ºE)	Latitude (ºN)	Time-period of data collection
Global solar radiation (HLY11-061)	Halifax Citadel	8202220	-63.6	44.7	1986-2002
Cloud-cover (HLY01-082)	Shearwater A	8205090	-63.5	44.6	1986-2016
	Bedford Mwo	8200576	-63.7	44.7	1995-1996
	Halifax Int'l A	8202251	-63.5	44.9	1986-2016
Rainfall (HLY03-123)	Shearwater Auto	8205091	-63.5	44.6	2007-2010

	Shearwater Rcs	8205092	-63.5	44.6	2008-2016
	Shearwater A	8205090	-63.5	44.6	1986-2007
	Halifax Int'l A	8202251	-63.5	44.9	1986-2016
Wind speed (HLY01-075) and wind direction (HLY01-156)	Halifax Kootenay	8202252	-63.6	44.6	2004-2016
	Mcnabs Island (Aut)	8203478	-63.5	44.6	1986-2016
	Osborne Head Dnd	8204190	-63.4	44.6	2004-2016
	Shearwater Auto	8205091	-63.4	44.6	1996-2004
	Shearwater Jetty	8205093	-63.5	44.6	1993-2016
	Shearwater Rcs	8205092	-63.5	44.6	1993-2016
	Shearwater A	8205090	-63.5	44.6	1986-2016
	Halifax Commons	8202221	-63.6	44.6	2010-2011
	Halifax Windsor Park	8202255	-63.6	44.7	2004-2016
	Halifax Dockyard	8202240	-63.6	44.7	2004-2016
	Bedford Basin	8200573	-63.6	44.7	2004-2016
	Bedford Mwo	8200576	-63.7	44.7	1995-1998
	Bedford Range	8200574	-63.7	44.8	2004-2016
	Halifax Int'l A	8202251	-63.7	44.8	1986-2016
Relative humidity (HLY01-080)	Halifax Kootenay	8202252	-63.6	44.6	2004-2016
	Mcnabs Island (Aut)	8203478	-63.5	44.6	1999-2016
	Osborne Head Dnd	8204190	-63.4	44.6	2004-2016
	Shearwater Auto	8205091	-63.4	44.6	1996-2010
	Shearwater Jetty	8205093	-63.5	44.6	1994-2016
	Shearwater Rcs	8205092	-63.5	44.6	2008-2016
	Shearwater A	8205090	-63.5	44.6	1986-2016
	Halifax Commons	8202221	-63.6	44.6	2010-2011
	Halifax Windsor Park	8202255	-63.6	44.7	2004-2016
	Halifax Dockyard	8202240	-63.6	44.7	2004-2016
	Bedford Basin	8200573	-63.6	44.7	2004-2016
	Bedford Mwo	8200576	-63.7	44.7	1995-1998
	Bedford Range	8200574	-63.7	44.8	2004-2016

	Halifax Int'l A	8202251	-63.7	44.8	1986-2016
Temperature (HLY01-078)	Halifax Kootenay	8202252	-63.6	44.6	2004-2016
	Mcnabs Island (Aut)	8203478	-63.5	44.6	1986-2016
	Osborne Head Dnd	8204190	-63.4	44.6	2004-2016
	Shearwater Auto	8205091	-63.4	44.6	1996-2010
	Shearwater Jetty	8205093	-63.5	44.6	1993-2016
	Shearwater Rcs	8205092	-63.5	44.6	2008-2016
	Shearwater A	8205090	-63.5	44.6	1986-2016
	Halifax Commons	8202221	-63.6	44.6	2010-2011
	Halifax Windsor Park	8202255	-63.6	44.7	2004-2016
	Halifax Dockyard	8202240	-63.6	44.7	2004-2016
	Bedford Basin	8200573	-63.6	44.7	2004-2016
	Bedford Mwo	8200576	-63.7	44.7	1995-1998
	Bedford Range	8200574	-63.7	44.8	2004-2016
	Halifax Int'l A	8202251	-63.7	44.8	1986-2016
Pressure (HLY01-077)	Halifax Kootenay	8202252	-63.6	44.6	2004-2016
	Mcnabs Island (Aut)	8203478	-63.5	44.6	2000-2016
	Osborne Head Dnd	8204190	-63.4	44.6	2004-2016
	Shearwater Auto	8205091	-63.4	44.6	1999-2010
	Shearwater Jetty	8205093	-63.5	44.6	2001-2016
	Shearwater Rcs	8205092	-63.5	44.6	2008-2016
	Shearwater A	8205090	-63.5	44.6	1986-2016
	Halifax Windsor Park	8202255	-63.6	44.7	2015-2016
	Halifax Dockyard	8202240	-63.6	44.7	2015-2016
	Bedford Basin	8200573	-63.6	44.7	2004-2016
	Bedford Range	8200574	-63.7	44.8	2004-2016
	Halifax Int'l A	8202251	-63.7	44.8	1986-2016
Snow-depth (DLY04-013)	Shearwater Auto	8205091	-63.5	44.6	1997-2010
	Shearwater Rcs	8205092	-63.5	44.6	2009-2016
	Shearwater A	8205090	-63.5	44.6	2009-2016

	Halifax Windsor Park	8202255	-63.6	44.7	1992-2007
	Halifax Int'l A	8202251	-63.7	44.8	1999-2016

Table S4. Climate gauging stations considered to prepare merged observational climate data for Moncton.

Climate variable	Station name	Climate ID	Longitude (ºE)	Latitude (ºN)	Time-period of data collection
Global solar radiation (HLY11-061)	Fredericton Cda*	8101600	-66.6	45.9	1986-2005
Cloud-cover (HLY01-082)	Moncton A	8103200	-64.7	46.1	1986-2012
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Rainfall (HLY03-123)	Moncton	8103100	-64.8	46.1	1996-1999
	Moncton A	8103200	-64.7	46.1	1986-2012
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Wind speed (HLY01-075) and wind direction (HLY01-156)	Moncton A	8103200	-64.7	46.1	1986-2012; 2016
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Relative humidity (HLY01-080)	Moncton A	8103200	-64.7	46.1	1986-2012; 2016
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Temperature (HLY01-078)	Moncton A	8103200	-64.7	46.1	1986-2012; 2016
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Pressure (HLY01-077)	Moncton A	8103200	-64.7	46.1	1986-2012; 2016
	Moncton Int'l A	8103201	-64.7	46.1	2012-2016
Snow-depth (DLY04-013)	Moncton A	8103200	-64.7	46.1	1992-2016

Table S5. Climate gauging stations considered to prepare merged observational climate data for Montreal.

Climate variable	Station name	Climate ID	Longitude (ºE)	Latitude (ºN)	Time-period of data collection
Global solar radiation (HLY11-061)	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1988-1998
Cloud-cover	Montreal/Pierre	7025250	-73.8	45.5	1986-2016

(HLY01-082)	Elliott Trudeau Int'l A				
	Montreal/St-Hubert A	7027320	-73.5	45.5	1986-2015
Rainfall (HLY03-123)	Ste Anne De Bellevue	7026839	-73.9	45.4	1986-1992
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1986-1994; 2005-2014
	Ste Dorothee	7027110	-73.8	45.5	1986-1997
	Montreal Jar Bot	7025257	-73.6	45.6	1986-2016
	Montreal Mcgill	7025280	-73.6	45.5	1986-1992
	Montreal Lafontaine	7025267	-73.6	45.5	1986-1992
	Montreal Jar Bot	7025257	-73.6	45.6	1986-1989
	Montreal/St-Hubert A	7027320	-73.4	45.5	1986-1999
Wind speed (HLY01-075) and wind direction (HLY01-156)	Ste-Anne-De-Bellevue 1	702FHL8	-73.9	45.4	1993-2016
	Ile Charron	702327R	-73.5	45.6	1991-2007
	Mobile Upper Air Station-Quebec	7025000	-73.9	45.4	2014-2016
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1986-2016
	Mctavish	7024745	-73.6	45.5	1993-2016
	Montreal/St-Hubert A	7027320	-73.4	45.5	1986-2005; 2009-2016
	Montreal-Est	7025252	-73.6	45.6	1994-2008
Relative humidity (HLY01-080)	Ste-Anne-De-Bellevue 1	702FHL8	-73.9	45.4	1994-2016
	Mobile Upper Air Station-Quebec	7025000	-73.9	45.4	2014-2016
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1986-2016
	Mctavish	7024745	-73.6	45.5	1993-2016
	Montreal/St-Hubert A	7027320	-73.4	45.5	1986-2016
	Montreal-Est	7025252	-73.6	45.6	1994-2006
Temperature (HLY01-078)	Ste-Anne-De-Bellevue 1	702FHL8	-73.9	45.4	1993-2016
	Mobile Upper Air Station-Quebec	7025000	-73.9	45.4	2014-2016
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1986-2016
	Mctavish	7024745	-73.6	45.5	1993-2016
	Montreal/St-Hubert A	7027320	-73.4	45.5	1986-2016
	Montreal-Est	7025252	-73.6	45.6	1994-2008
Pressure	Ste-Anne-De-Bellevue	702FHL8	-73.9	45.4	1994-2016

(HLY01-077)	1				
	Mobile Upper Air Station-Quebec	7025000	-73.9	45.4	2014-2016
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1986-2016
	Mctavish	7024745	-73.6	45.5	1999-2016
	Montreal/St-Hubert A	7027320	-73.4	45.5	1986-2016
Snow-depth (DLY04-013)	Ste-Anne-De-Bellevue 1	702FHL8	-73.9	45.4	2003-2016
	Montreal/Pierre Elliott Trudeau Int'l A	7025250	-73.8	45.5	1992-2016
	Mctavish	7024745	-73.6	45.5	2015-2016

Table S6. Climate gauging stations considered to prepare merged observational climate data for Ottawa.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation (HLY11-061)	Ottawa CDA	6105976	-75.7	45.4	1986-2002
Cloud-cover (HLY01-082)	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1986-2016
Rainfall (HLY03-123)	Ottawa Cda Rcs	6105978	-75.7	45.4	2002-2014
	Ottawa Cda	6105976	-75.7	45.4	1986-2001
	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1986-2007
Wind speed (HLY01-075) and wind direction (HLY01-156)	Ottawa Cda Rcs	6105978	-75.7	45.4	2000-2016
	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1986-2016
Relative humidity (HLY01-080)	Ottawa Cda Rcs	6105978	-75.7	45.4	2000-2016
	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1986-2016
Temperature (HLY01-078)	Ottawa Cda Rcs	6105978	-75.7	45.4	2000-2016
	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1986-2016
Pressure (HLY01-077)	Ottawa Cda Rcs	6105978	-75.7	45.4	2003-2016
	Ottawa	6106000	-75.7	45.3	1986-2016

	Macdonald-Cartier Int'l A				
Snow-depth (DLY04-013)	Ottawa Cda Rcs	6105978	-75.7	45.4	2000-2016
	Ottawa Macdonald-Cartier Int'l A	6106000	-75.7	45.3	1992-2016

Table S7. Climate gauging stations considered to prepare merged observational climate data for Saskatoon.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation (HLY11-061)	Outlook Pfra	4055736	-107.1	51.5	1988-1998
Cloud-cover (HLY01-082)	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-2016
Rainfall (HLY03-123)	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-1990
	Saskatoon Rcs	4057165	-106.7	52.2	2009-2016
	Saskatoon Water Tp	4057202	-106.7	52.1	1986-2002
	Saskatoon Src	4057180	-106.7	52.1	1986-1992
Wind speed (HLY01-075) and wind direction (HLY01-156)	Saskatoon Kernen Farm	4057154	-106.6	52.2	1996-2006
	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-2016
	Saskatoon Rcs	4057165	-106.7	52.2	2008-2016
Relative humidity (HLY01-080)	Saskatoon Kernen Farm	4057154	-106.6	52.2	1996-2006
	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-2016
	Saskatoon Rcs	4057165	-106.7	52.2	2008-2016
Temperature (HLY01-078)	Saskatoon Kernen Farm	4057154	-106.6	52.2	1996-2006
	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-2016
	Saskatoon Rcs	4057165	-106.7	52.2	2008-2016
Pressure (HLY01-077)	Saskatoon Kernen Farm	4057154	-106.6	52.2	1996-2006

	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1986-2016
	Saskatoon Rcs	4057165	-106.7	52.2	2008-2016
Snow-depth (DLY04-013)	Saskatoon Diefenbaker Int'l A	4057120	-106.7	52.2	1992-1996
	Saskatoon Rcs	4057165	-106.7	52.2	2008-2016

Table S8. Climate gauging stations considered to prepare merged observational climate data for St. Johns.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation (HLY11-061)	St John's West Cda	8403600	-52.8	47.5	1986-1999
Cloud-cover (HLY01-082)	St. John's Int'l A	8403505	-52.8	47.6	1986-2016
	Kelligrews	8402478	-53.0	47.5	1987-1989
	Long Pond	840N001	-53.0	47.5	1997-2015
Rainfall (HLY03-123)	St. John's A	8403506	-52.8	47.6	1986-1997
	St John's West Cda	8403600	-52.8	47.5	1991-1996
	St Johns West Climate	8403603	-52.8	47.5	2010-2016
Wind speed (HLY01-075) and wind direction (HLY01-156)	St. John's Int'l A	8403505	-52.8	47.6	1986-2016
	St John's West Cda Cs	8403605	-52.8	47.5	1999-2013
	St Johns West Climate	8403603	-52.8	47.5	2010-2018
	Long Pond	840N001	-53.0	47.5	1997-2015
	Kelligrews	8402478	-53.0	47.5	1987-1989
Relative humidity (HLY01-080)	St. John's Int'l A	8403505	-52.8	47.6	1986-2016
	St John's West Cda Cs	8403605	-52.8	47.5	1999-2013
	St Johns West Climate	8403603	-52.8	47.5	2010-2018
	Long Pond	840N001	-53.0	47.5	1997-2015
	Kelligrews	8402478	-53.0	47.5	1987-1989
Temperature (HLY01-078)	St. John's Int'l A	8403505	-52.8	47.6	1986-2016
	St John's West Cda Cs	8403605	-52.8	47.5	1999-2013
	St Johns West Climate	8403603	-52.8	47.5	2010-2018

	Long Pond	840N001	-53.0	47.5	1997-2015
	Kelligrews	8402478	-53.0	47.5	1987-1989
Pressure (HLY01-077)	St. John's Int'l A	8403505	-52.8	47.6	1986-2016
	St John's West Cda Cs	8403605	-52.8	47.5	1999-2013
	St Johns West Climate	8403603	-52.8	47.5	2010-2018
	Long Pond	840N001	-53.0	47.5	1997-2015
	Kelligrews	8402478	-53.0	47.5	1987-1989
Snow-depth (DLY04-013)	St. John's Int'l A	8403505	-52.8	47.6	1992-2016

Table S9. Climate gauging stations considered to prepare merged observational climate data for Toronto.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation (HLY11-061)	Toronto Met Res Stn	6158740	-79.6	43.8	1986-1988
	Toronto	6158350	-79.4	43.7	1986-2001
Cloud-cover (HLY01-082)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2016
Rainfall (HLY03-123)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Toronto Met Res Stn	6158740	-79.6	43.8	1986-1988
	Toronto Old Weston Rd	6158764	-79.5	43.7	1986-1990
	Toronto North York	615S001	-79.5	43.8	1998-2007
	Toronto	6158350	-79.4	43.7	1953-2002
	Toronto City	6158355	-79.4	43.7	2002-2016
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2007
	Richmond Hill 2	6157015	-79.4	43.9	1989-1991
	Toronto Ellesmere	6158520	-79.3	43.8	1986-1995
	Toronto Nashdene	6158748	-79.3	43.8	1986-1995
	Toronto Booth	6158406	-79.4	43.7	1986-1993
Wind speed (HLY01-075) and wind	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Pa Downsview	6156161	-79.6	43.8	2015-2016

direction (HLY01-156)	Toronto City	6158355	-79.4	43.7	2002-2015
	Toronto City Centre	6158359	-79.4	43.6	2006-2016
	Toronto Is A (Aut)	6158666	-79.4	43.6	1986-1994
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2016
Relative humidity (HLY01-080)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Pa Downsview	6156161	-79.6	43.8	2015-2016
	Toronto City	6158355	-79.4	43.7	2002-2015
	Toronto City Centre	6158359	-79.4	43.6	2006-2016
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2016
Temperature (HLY01-078)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Toronto City Centre	6158355	-79.4	43.6	2006-2016
	Toronto Is A (Aut)	6158359	-79.4	43.6	1986-1994
	Toronto City	6158666	-79.4	43.7	2002-2016
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2016
Pressure (HLY01-077)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1986-2016
	Toronto City Centre	6158355	-79.4	43.6	2006-2016
	Toronto City	6158666	-79.4	43.7	2002-2016
	Toronto Buttonville A	6158409	-79.4	43.9	1986-2016
	Pa Downsview	6156161	-79.6	43.8	2015-2016
Snow-depth (DLY04-013)	Toronto Lester B. Pearson Int'l A	6158733	-79.6	43.7	1992-2016
	Toronto	6158350	-79.6	43.7	2013-2016
	Toronto City	6158666	-79.4	43.7	2002-2016
	Toronto Buttonville A	6158409	-79.4	43.9	2003-2016

Table S10. Climate gauging stations considered to prepare merged observational climate data for Vancouver.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation	Vancouver Ubc	1108487	-123.3	49.3	1986-1991

(HLY11-061)					
Cloud-cover (HLY01-082)	Abbotsford A	1100030	-122.4	49.0	1986-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2016
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
Rainfall (HLY03-123)	White Rock Stp	1108914	-122.8	49.0	1986-2002
	Surrey Municipal Hall	1107876	-122.8	49.1	1986-2000
	Richmond Operations Centre	1105210	-123.1	49.2	2013-2015
	Surrey Kwantlen Park	1107873	-122.9	49.2	1986-1999
	Vancouver Sea Island Ccg	1108380	-123.2	49.2	2013-2015
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2013
	Vancouver Ubc	1108487	-123.3	49.3	1986-1990
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
	Burnaby Mtn Bchpa	110JA54	-122.9	49.3	1986-1992
	Port Moody Glenayre	1106CL2	-122.9	49.3	1986-2003
	Port Coquitlam City Yard	1106256	-122.8	49.3	1986-1990
Wind speed (HLY01-075) and wind direction (HLY01-156)	Delta Burns Bog	1102415	-123.0	49.1	2010-2016
	Vancouver Sea Island Ccg	1108380	-123.2	49.2	2013-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2016
	Richmond Operations Centre	1105210	-123.1	49.2	2011-2015
	Vancouver Hillcrest	1108433	-123.1	49.2	2009-2010
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
	West Vancouver Aut	1108824	-123.1	49.3	1992-2016
	Pitt Meadows Cs	1106178	-122.7	49.2	1994-2016
Relative humidity (HLY01-080)	Delta Burns Bog	1102415	-123.0	49.1	2010-2016
	Vancouver Sea Island Ccg	1108380	-123.2	49.2	2013-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2016
	Richmond Operations Centre	1105210	-123.1	49.2	2011-2015

	Vancouver Hillcrest	1108433	-123.1	49.2	2009-2010
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
	West Vancouver Aut	1108824	-123.1	49.3	1994-2016
	Pitt Meadows Cs	1106178	-122.7	49.2	1994-2016
	Point Atkinson		-123.3	49.3	2013-2016
Temperature (HLY01-078)	Delta Burns Bog	1102415	-123.0	49.1	2010-2016
	Vancouver Sea Island Ccg	1108380	-123.2	49.2	2013-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2016
	Richmond Operations Centre	1105210	-123.1	49.2	2011-2015
	Vancouver Hillcrest	1108433	-123.1	49.2	2009-2010
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
	West Vancouver Aut	1108824	-123.1	49.3	1994-2016
	Pitt Meadows Cs	1106178	-122.7	49.2	1994-2016
	Point Atkinson	1106200	-123.3	49.3	2013-2016
	White Rock Campbell Scientific	1108910	-122.8	49.0	1993-2016
Pressure (HLY01-077)	Delta Burns Bog	1102415	-123.0	49.1	2010-2016
	Vancouver Sea Island Ccg	1108380	-123.2	49.2	2013-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1986-2016
	Richmond Operations Centre	1105210	-123.1	49.2	2011-2015
	Vancouver Harbour Cs	1108446	-123.1	49.3	1986-2015
	West Vancouver Aut	1108824	-123.1	49.3	1994-2016
	Pitt Meadows Cs	1106178	-122.7	49.2	1994-2016
	Point Atkinson	1106200	-123.3	49.3	2013-2016
	White Rock Campbell Scientific	1108910	-122.8	49.0	1993-2016
Snow-depth (DLY04-013)	West Vancouver Aut	1108824	-123.1	49.3	2005-2016
	Vancouver Int'l A	1108447	-123.2	49.2	1992-2016
	Richmond	1105210	-123.1	49.2	2013-2015

	Operations Centre				
	Pitt Meadows Cs	1106178	-122.7	49.2	2013-2016
	White Rock Campbell Scientific	1108910	-122.8	49.0	2014-2016

Table S11. Climate gauging stations considered to prepare merged observational climate data for Winnipeg.

Climate variable	**Station name**	**Climate ID**	**Longitude (ºE)**	**Latitude (ºN)**	**Time-period of data collection**
Global solar radiation (HLY11-061)	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2000
Cloud-cover (HLY01-082)	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2016
Rainfall (HLY03-123)	Winnipeg The Forks	5023262	-97.1	50.0	2005-2015
	Winnipeg A Cs	502S001	-97.3	49.9	2005-2016
	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-1990
	Winnipeg Hangarline Road	5023224	-97.2	49.9	1994-1996
Wind speed (HLY01-075) and wind direction (HLY01-156)	Winnipeg The Forks	5023262	-97.1	50.0	1999-2016
	Winnipeg A Cs	502S001	-97.3	49.9	2013-2016
	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2016
	Winnipeg Richardson Awos	5023226	-97.2	49.9	2008-2012
Relative humidity (HLY01-080)	Winnipeg The Forks	5023262	-97.1	50.0	1999-2016
	Winnipeg A Cs	502S001	-97.3	49.9	2013-2016
	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2016
	Winnipeg Richardson Awos	5023226	-97.2	49.9	2008-2012
Temperature (HLY01-078)	Winnipeg The Forks	5023262	-97.1	50.0	1999-2016
	Winnipeg A Cs	502S001	-97.3	49.9	2013-2016

	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2016
	Winnipeg Richardson Awos	5023226	-97.2	49.9	2008-2012
Pressure (HLY01-077)	Winnipeg The Forks	5023262	-97.1	50.0	2001-2016
	Winnipeg A Cs	502S001	-97.3	49.9	2013-2016
	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1986-2016
	Winnipeg Richardson Awos	5023226	-97.2	49.9	2008-2012
Snow-depth (DLY04-013)	Winnipeg A Cs	502S001	-97.3	49.9	1997-2016
	Winnipeg Richardson Int'l A	5023222	-97.2	49.9	1992-1997

Table S12. Bias correction validation results for pressure, relative humidity, temperature, cloud-cover, wind-speed, and wind-direction.

City	Climate variable	$RMSE_{model}$ (%) - $RMSE_{bc}$ (%)	MB_{model} (%)	MB_{bc} (%)	Obs_{avg}	$Model_{avg}$	$Model_{bc,avg}$
Calgary	Pressure (kPa)	0.1	0.1	~0.0	88.9	88.8	88.9
	Relative humidity (%)	9.1	-25.3	0.2	63.0	79.0	62.9
	Temperature (ºC)	1.4	10.1	-4.0	4.8	4.4	5.0
	Cloud-cover (%)	4.1	9.2	3.7	60.9	55.3	58.6
	Wind speed (m/s)	12.7	-14.9	6.3	4.0	4.6	3.7
	Wind direction (º)	2.4	-7.9	-1.2	202.7	218.8	205.1
Charlottetown	Pressure (kPa)	0.1	-0.3	0.1	100.8	101.0	100.7
	Relative humidity (%)	1.9	-4.3	0.6	78.1	81.5	77.6
	Temperature (ºC)	40.0	-70.1	-6.8	6.5	11.0	6.9

	Cloud-cover (%)	4.2	9.4	6.2	70.3	63.7	65.9
	Wind speed (m/s)	62.6	-82.6	-1.0	4.4	8.1	4.5
	Wind direction (º)	1.2	-4.3	-2.2	205.0	213.9	209.6
Halifax	Pressure (kPa)	-0.1	0.1	0.5	100.8	100.7	100.2
	Relative humidity (%)	1.9	-9.2	-1.2	78.0	85.3	78.9
	Temperature (ºC)	7.2	-33.7	-6.9	7.6	10.1	8.1
	Cloud-cover (%)	3.7	6.5	2.3	67.7	63.4	66.2
	Wind speed (m/s)	5.6	-12.7	-1.4	4.4	4.9	4.4
	Wind direction (º)	1.0	-1.4	-0.7	213.7	216.7	215.1
Moncton	Pressure (kPa)	~0	0.2	0.1	100.7	100.6	100.6
	Relative humidity (%)	1.2	-2.7	-0.9	77.0	79.1	77.7
	Temperature (ºC)	8.7	-41.1	-10.4	6.2	8.7	6.8
	Cloud-cover (%)	3.5	6.0	3.0	65.7	61.7	63.7
	Wind speed (m/s)	-1.4	28.3	4.5	4.8	3.4	4.6
	Wind direction (º)	1.6	-8.2	-4.1	195.9	211.9	203.8
Montreal	Pressure (kPa)	0.1	0.3	-0.1	101.0	100.7	101.1
	Relative humidity (%)	4.5	-15.5	-0.7	70.3	81.2	70.8
	Temperature (ºC)	3.4	-23.0	-9.3	7.6	9.3	8.3
	Cloud-cover (%)	3.2	10.3	6.1	64.4	57.7	60.5
	Wind speed (m/s)	15.9	-25.5	0.7	3.5	4.4	3.5

	Wind direction (º)	1.1	-7.7	-4.8	190.5	205.2	199.6
Ottawa	Pressure (kPa)	0.1	0.3	0.2	100.3	100.0	100.1
	Relative humidity (%)	1.8	-9.6	3.8	73.1	80.1	70.3
	Temperature (ºC)	3.9	-28.4	-13.3	7.1	9.1	8.0
	Cloud-cover (%)	2.8	5.3	2.4	62.1	58.8	60.6
	Wind speed (m/s)	2.8	-3.3	1.4	3.5	3.6	3.5
	Wind direction (º)	1.2	-5.9	-2.5	197.6	209.2	202.6
Saskatoon	Pressure (kPa)	0.1	0.5	~0.0	95.4	95.0	95.4
	Relative humidity (%)	4.3	-11.1	2.7	73.0	81.2	71.0
	Temperature (ºC)	11.6	-72.6	-19.7	2.9	4.9	3.4
	Cloud-cover (%)	4.9	10.6	5.1	60.5	54.1	57.4
	Wind speed (m/s)	27.2	-38.4	3.0	4.3	6.0	4.2
	Wind direction (º)	2.0	-8.6	-2.3	193.2	209.8	197.8
St Johns	Pressure (kPa)	0.4	-1.1	0.1	99.8	101.0	99.7
	Relative humidity (%)	1.8	-3.8	-0.3	82.6	85.7	82.4
	Temperature (ºC)	48.9	-78.6	-5.8	4.1	7.2	4.3
	Cloud-cover (%)	2.1	-0.9	0.9	75.9	76.7	75.3
	Wind speed (m/s)	39.8	-60.1	-3.9	5.2	8.3	5.4
	Wind direction (º)	0.9	-0.6	-0.1	210.7	211.8	210.9
Toronto	Pressure (kPa)	-0.1	-0.1	0.2	99.9	99.9	99.7
	Relative	5.3	-14.8	-3.9	70.6	81.1	73.4

	humidity (%)						
	Temperature (ºC)	12.9	-13.8	-1.3	9.1	10.3	9.2
	Cloud-cover (%)	5.3	11.5	4.2	63.0	55.8	60.3
	Wind speed (m/s)	38.2	-50.7	-0.3	4.1	6.2	4.1
	Wind direction (º)	0.7	-2.8	-0.4	201.3	206.9	202.1
Vancouver	Pressure (kPa)	1.6	2.5	-0.4	101.2	98.6	101.6
	Relative humidity (%)	18.8	-39.3	1.6	63.0	87.8	62.0
	Temperature (ºC)	7.7	22.7	-11.0	10.3	8.0	11.4
	Cloud-cover (%)	3.9	-0.9	0.6	68.4	69.1	68.0
	Wind speed (m/s)	37.8	-45.1	-2.8	2.8	4.1	2.9
	Wind direction (º)	3.7	-13.4	-1.9	148.5	168.5	151.3
Winnipeg	Pressure (kPa)	0.1	0.2	~0	98.6	98.4	98.6
	Relative humidity (%)	4.2	-12.5	-1.5	71.6	80.5	72.7
	Temperature (ºC)	8.7	-58.6	-13.5	4.0	6.4	4.6
	Cloud-cover (%)	4.9	5.8	2.2	58.7	55.3	57.4
	Wind speed (m/s)	37.3	-57.6	-10.0	3.8	6.0	4.2
	Wind direction (º)	1.2	-3.0	-0.5	203.2	209.3	204.1

Table S13. Bias correction validation results for rainfall and snow cover.

City	Data source	Mean wet-day rainfall (mm)	Number of rainy hours	Number of snow hours
Calgary	Observations	1.3	2531	33497
	Model	0.2	27583	65730
	Bias-corrected model	1.2	2826	26670
Charlottetown	Observations	1.1	4763	33432
	Model	0.2	30210	31224
	Bias-corrected model	1.4	4428	32183
Halifax	Observations	1.4	10742	27336
	Model	0.3	73959	28464
	Bias-corrected model	1.9	9834	27554
Moncton	Observations	1.4	8633	36932
	Model	0.2	71274	38637
	Bias-corrected model	1.3	8619	34472
Montreal	Observations	1.1	3265	32083
	Model	0.2	22228	44068
	Bias-corrected model	0.8	4549	28256
Ottawa	Observations	1.3	5357	35784
	Model	0.2	38884	43488
	Bias-corrected model	1.3	5506	32892
Saskatoon	Observations	1.3	1581	27576
	Model	0.2	16919	36744
	Bias-corrected model	0.8	2056	25133
St. Johns	Observations	1.2	6060	36744
	Model	0.2	40948	41236
	Bias-corrected model	1.4	4384	33126
Toronto	Observations	1.1	8148	31440
	Model	0.2	47806	38376
	Bias-corrected model	1.0	9445	30364
Vancouver	Observations	0.9	15695	2568
	Model	0.3	74541	72576
	Bias-corrected model	0.6	29229	10497
Winnipeg	Observations	1.6	1414	27456
	Model	0.2	13297	31949
	Bias-corrected model	1.4	1081	25706

Table S14. Bias correction validation results for global horizontal irradiance (GHI).

City	$RMSE_{model}$ (%) - $RMSE_{bc}$ (%)	MB_{model} (%)	MB_{bc} (%)
Calgary	2.0	-3.3	0.2
Charlottetown	5.5	-7.3	-0.9
Halifax	5.5	-6.7	1.3

Moncton	4.8	-4.8	1.4
Montreal	6.2	-3.8	2.9
Ottawa	5.0	-2.7	1.7
Saskatoon	4.9	-8.6	-4.2
St. Johns	2.5	4.1	-1.5
Toronto	12.3	-14.9	0.9
Vancouver	4.3	-14.5	-8.8
Winnipeg	4.0	-12.3	-6.6