Window Repair Guidance

Davis, John Michael. "New Life for Old Windows." *Fine Homebuilding* 192 (December/January 2008): 76-79.

Gibney, David, "Restoring Window Sashes." *Fine Homebuilding* 161 (February/March 2004):84-89.

Goulart, Beth, "Saving Sash Windows." *Old House Journal* (June 2009): 52-57.

Jordan, Steve, The Window Sash Bible. Steve Jorden, Rochester, NY, 2015.

Leeke, John, *Save America's Windows*. John Leek's Historic HomeWorks, Portland Maine, 2009. http://www.historichomeworks.com/hhw/reports/reports.htm#Windows

Leeke, John, editor, Window Preservation Standards. Window Preservation Standards Collaborative, 2013.

O'Donnell, Bill, "Troubleshooting Old Windows." *Old House Journal* (January-February 1986): 16-21.

Tschoepe, Ray, "Weatherstripping 101." *Old House Journal* (December 2008): 68-71.

Videos on the Web

http://www.youtube.com/watch?v=WUSGILSfzwE&feature=related&safety_mode=true&persist_safety_mode=1
Most comprehensive, covering many of the details important to success: includes cautions and strategies for dealing with lead paint; Parts 1 and 2 deal with window disassembly and include putty removal and paint stripping; Part 3 covers reglazing; Part 4 demonstrates application of spring-bronze weatherstripping and weight-cord replacement. Fails to deal with window fit, particularly as it applies to weaterstripping

http://www.youtube.com/watch?v=qssB_kLJmqQ&safety_mode=true&persist_safety_mode=1
Demonstrates removal and application of putty to a sash; basic repair rather than complete renewal.

http://www.youtube.com/watch?v=_J5oNMfI5og&feature=related&safety_mode=true&persist_safety_mode=1
John Leeke covers replacement of putty-set glass in an open sash

http://www.youtube.com/watch?v=DsvwtWZR-R4&feature=related&safety_mode=true&persist_safety_mode=1
Sash cord replacement; thorough guidance, just not a particularly careful approach to disassembly.

http://www.dummies.com/how-to/content/how-to-install-weather-stripping.html
Demonstrates installation of vinyl v-seal peel and stick, perhaps the simplest but least durable and effective of weatherstripping options.

Weatherstripping Suppliers & Manufacturers

Silicone and polypropylene leafs and bulbs
Conservation Technologies has the bulb weatherstripping that is good for the tops and bottoms of sashes, inexpensive vinyl leaf for a range of applications as well has some good solutions for doors. Their catalog has good descriptive guidance on matching weatherstripping type to application.
http://www.conservationtechnology.com/

Interlock: flange metal strips for the jambs with a flange to fit into a kerf cut in the sash are available from:
Dorbin Metal (Chicago)
773-242-2333

Zero International (Bronx, NY)
www.zerointernational.com
800-635-5335

Accurate (Mount Vernon, NY)
www.accurateweatherstrip.com
800-536-6043

Cushion or V bronze for the jambs is available from all three companies listed above and also from:
National Guard (Memphis, TN)
www.ngpinc.com/product

Storm Window Manufacturers

Wood
Adams Architectural (Dubuque, IA)
www.**adams**arch.com
888.285.8120

Spencer Works (Lincoln, NE)
www.spencerworks.com
402-499-7848

GreenWood Workshop LLC (Louisville, KY).
www.greenwoodworkshop.com
502-894-0501

Marvin Windows
Storm windows are not included on their website, but they do still make them; check with distributor

Basic aluminum in various models is available locally at Lowes
Last I checked they had three models in each of two brands. The most expensive were not the best from an appearance point of view, having unduly bulky frames.

Better quality aluminum
Allied Window Inc.(Cincinnati, OH)
www.alliedwindow.com
513-559-1212

Monray (Minneapolis, MN)
Monray.com
800-544-3646
They have a model with a balance assist particularly useful for large windows

Window Performance Studies

Testing the Energy Performance of Wood Windows in Cold Climates. a 1996 study done by the State of Vermont, http://ncptt.nps.gov/2008/testing-the-energy-performance-of-wood-windows-in-cold-climates-a-report-to-the-state-of-vermont-division-for-historic-preservation-agency-of-commerce-and-community-development-1996-08/

This study investigated the installed costs for a range of window upgrades and their resulting energy savings. Through field testing it was found that replacing an historic window does not necessarily result in greater energy savings than upgrading that same window. Both air sealing between the window frame and the wall and the use of a storm window were found to be effective at reducing energy costs.

The Effects of Energy Efficiency Treatments on Historic Windows. published in January, 2011 by The Center for Resource Conservation in Boulder Colorado.
https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Effects%2520of%2520Energy%2520on%2520Historic%2520Windows.pdf

This study of window treatments provides data on the energy performance of old wood windows with various upgrades. The study involved retrofitting windows in a test home in a historic district in Boulder, Colorado as well as testing in a laboratory facility developed for the study. Summary tables provide thermal performance for six different treatment options as well as the original wood window and a new vinyl one. The dollar value of energy savings for the options as they would be implemented on the sample house are calculated for seven US cities, taking into account differences in energy costs and climate. Typical costs of performing the various treatments are not included. Most of the proposed treatments were able to outperform a new vinyl window. The study provides data for several less typical treatments, such retrofitting old windows with IGUs and using IGUs in storm windows, rather than some of the more commonly used ones.

Measured Winter Performance of Storm Windows. a 2002 study done by Lawrence Berkeley National Labs, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=2373&context=lbnl

In tests under actual winter weather conditions, north-facing prime/storm window combinations were compared to a selective low-E replacement window. It was found that the addition of low-E storm windows to the prime window provided performance very similar to that of the replacement window, and expected differences in performance were only detectable through a long-term averaging. Additionally infiltration did not significantly degrade the expected performance.

Field Evaluation of Low-E Storm Windows. Chicago, 2007
http://www.toolbase.org/Field-Evaluations/existinghomeschicago

Field monitoring of six homes in Chicago indicated that there is consistent benefit to using storm windows. Clear glass storm windows reduced the heating load by 13% with a 10-year simple payback. Low-e storm windows also showed an additional improvement on top of the clear glass benefits, amounting to 21% heating savings and an average payback of less than five years. One of the ancillary benefits of installing storm windows is reduced air infiltration.

A Comparative Study of the Cumulative Energy Use of Historical Versus Contemporary Windows. A 2010 study by Boston professionals funded by the Boston Society of Architects. http://www.frankshirleyarchitects.com/about-sustainability.html

Life cycle costs were calculated and compared for a typical wood double-hung window with an added Low-E storm window and a new vinyl replacement window. Using modeling and adapting previous field studies to a Boston location, it was determined that the thermal performances of the two window systems are similar; and taking all costs into account, the historical window with a storm has a much lower life-cycle cost throughout a 100-year period. It does not seem, however, that the sources used for air leakage numbers take into account the infiltration that can occur between the window unit and the wall assembly.

Saving Windows, Saving Money:Evaluation the Energy Performance of Window Retrofit and Replacement. A 2012 report by NTHP Preservation Green Lab, Cascadia and Ecotope.

Computer simulations based on a prototype house were used to generate energy, carbon and cost savings for multiple window improvement options for five US cities. Energy savings for various treatment combinations are realistically represented by a range appropriate for the variables involved in conditions, product and installation. The costs assumed for executing the treatments are not always consistent with what might be considered the typical approach, so they need to be understood when evaluating the return on investment data that brings together energy savings and cost of execution for the various treatments. One or more improvement approaches for each climate represented are found to achieve energy savings in the range of a new efficient replacement window and in any climate there is something that can be done that offers a better return on the investment than replacement windows.