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Daylight Saving Time

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Summary

Daylight Saving Time (DST) is a period of the year between spring and fall when clocks in the United States are set one hour ahead of standard time. DST is currently observed in the United States from 2:00 a.m. on the second Sunday in March until 2:00 a.m. on the first Sunday in November. The following states and territories do not observe DST: Arizona (except the Navajo Nation, which does observe DST), Hawaii, American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands.

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When and Why Was Daylight Saving Time Enacted?

Daylight Saving Time (DST) a period of the year between spring and fall when clocks in the United States are set one hour ahead of standard time. It is not a new concept. In 1784, Benjamin Franklin, Minister to France, had an idea that part of the year when the sun rises while most people are still asleep, clocks could be reset to allow an extra hour of daylight during waking hours. He calculated that French shopkeepers could save one million francs per year on candles. In 1907, William Willett, a British builder, Member of Parliament, and fellow of the Royal Astronomical Society, proposed the adoption of advanced time. The bill was reported favorably, asserting that DST would move hours of work and recreation more closely to daylight hours, reducing expenditures on artificial light. After much opposition, however, the bill was not adopted.

During World War I, in an effort to conserve fuel, Germany began observing DST on May 1, 1916. As the war progressed, the rest of Europe adopted DST. The plan was not formally adopted in the United States until 1918. “An Act to preserve daylight and provide standard time for the United States” was enacted on March 19, 1918 (40 Stat 450). It established both standard time zones and set summer DST to begin on March 31, 1918. The idea was unpopular, however, and Congress abolished DST after the war, overriding President Woodrow Wilson’s veto. DST became a local option and was observed in some states until World War II, when President Franklin Roosevelt instituted year-round DST, called “War Time,” on February 9, 1942. It ended on the last Sunday in September 1945. The next year, many states and localities adopted summer DST.

By 1962, the transportation industry found the lack of nationwide consistency in time observance confusing enough to push for federal regulation. This drive resulted in the Uniform Time Act of 1966 (P.L. 89-387). The act mandated standard time within the established time zones and provided for advanced time: clocks would be advanced one hour beginning at 2:00 a.m. on the last Sunday in April and turned back one hour at 2:00 a.m. on the last Sunday in October. States were allowed to exempt themselves from DST as long as the entire state did so. If a state chose to observe DST, the time changes were required to begin and end on the established dates. In 1968, Arizona became the first state to exempt itself from DST. In 1972, the act was amended (P.L. 92-267), allowing those states split between time zones to exempt either the entire state or that part of the state lying within a different time zone. The newly created Department of Transportation (DOT) was given the power to enforce the law. Currently, the following states and territories do not observe DST: Arizona, Hawaii, American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands.

During the 1973 oil embargo by the Organization of the Petroleum Exporting Countries (OPEC), in an effort to conserve fuel, Congress enacted a trial period of year-round DST (P.L. 93-182), from January 6, 1974, to April 27, 1975. From the beginning, the trial was hotly debated. Those in favor pointed to the benefits of increased daylight hours in the winter evening: more time for recreation, reduced lighting and heating demands, reduced crime, and reduced automobile accidents. The opposition was concerned about children leaving for school in the dark. The act was amended in October 1974 (P.L. 93-434) to return to standard time for the period beginning October 27, 1974, and ending February 23, 1975, when DST resumed. When the trial ended in 1975, the country returned to observing summer DST (with the aforementioned exceptions).

DOT, charged with evaluating the plan of extending DST into March, reported in 1975 that “modest overall benefits might be realized by a shift from the historic six-month DST (May through October) in areas of energy conservation, overall traffic safety and reduced violent

crime.” However, DOT also reported that these benefits were minimal and difficult to distinguish from seasonal variations and fluctuations in energy prices.

Congress then asked the National Bureau of Standards (NBS) to evaluate the DOT report. In an April 1976 report to Congress, Review and Technical Evaluation of the DOT Daylight Saving Time Study, NBS found no significant energy savings or differences in traffic fatalities. It did find statistically significant evidence of increased fatalities among school-age children in the mornings during the four-month period January-April 1974 as compared with the same period (non-DST) of 1973. NBS stated that it was impossible to determine, what if any of this increase was due to DST. When this same data was compared between 1973 and 1974 for the individual months of March and April, no significant difference was found for fatalities among school-age children in the mornings.

Has the Law Been Amended Since Inception?

Yes. In 1986, Congress enacted P.L. 99-359, which amended the Uniform Time Act by changing the beginning of DST to the first Sunday in April and having the end remain the last Sunday in October.

In 2005, Congress enacted P.L. 109-58, the Energy Policy Act of 2005. Section 110 of this act amended the Uniform Time Act, by changing DST to begin the second Sunday in March and end the first Sunday in November. The act required the Secretary of the Department of Energy (DOE) to report to Congress on the impact of extended DST on energy consumption in the United States. In October 2008, DOE sent its report to Congress.¹ After reviewing the DOE report, Congress retained the right under the law to revert DST to the 2005 time schedule. For more information on the legislation that changed DST, see CRS Report RL32860, Energy Efficiency and Renewable Energy Legislation in the 109th Congress, by Fred Sissine.

Which States and Territories Do Not Observe DST?

Arizona (except for the Navajo Nation), Hawaii, Puerto Rico, American Samoa, Guam, the Northern Mariana Islands and the U.S. Virgin Islands do not recognize daylight saving time.²

What Other Countries Observe DST?

DST is observed in approximately 70 countries, including most of those in North America and Europe. For a complete listing of countries that observe DST, please see Worldtimezone.com and WebExhibits.org websites.

¹ U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, *Impact of Extended Daylight Saving Time on National Energy Consumption*, October 2008, at http://www1.eere.energy.gov/ba/pba/pdfs/epact_sec_110_edst_report_to_congress_2008.pdf.

² National Institute of Standards and Technology (NIST), *Frequently Asked Questions (FAQ)*, December 4, 2015, at <http://www.nist.gov/pml/div688/localtime.cfm>.

Which Federal Agency Regulates DST in the United States?

The Department of Transportation, Office of the General Counsel, oversees and regulates DST.³

How Does an Area Move on or off DST?

Under the Uniform Time Act, moving an area on or off DST is accomplished through legal action at the state level.⁴ Some states require legislation whereas others require executive action such as a governor's executive order. Information on procedures required in a specific state may be obtained from that state's legislature or governor's office. If a state decides to observe DST, the dates of observance must comply with federal legislation.

As of September 2015, 12 states were considering opting out of the Uniform Time Act of 1966.⁵

How Can States and Territories Change an Area's Time Zone?

An area's time zone can only be changed by law. Under the Standard Time Act of 1918, as amended by the Uniform Time Act of 1966, moving a state or an area within a state from one time zone to another requires DOT regulation. The governor or state legislature makes the request for a state or any part of the state; the highest county-elected officials may make the request for that county. The standard for deciding whether to change the time zone is the area's convenience of commerce. The convenience of commerce is defined broadly to consider such circumstances as the shipment of goods within the community; the origin of television and radio broadcasts; the areas where most residents work, attend school, worship, or receive health care; the location of airports, railways, and bus stations; and the major elements of the community's economy.

After receiving a request, DOT determines whether it meets the minimum statutory criteria before issuing a notice of proposed rulemaking, which would solicit public comment and schedule a public hearing. Usually the hearing is held in the area requesting the change so that all affected parties can be represented. After the comment period closes, comments are reviewed and appropriate final action is taken. If the Secretary agrees that the statutory requirement has been met, the change would be instituted, usually at the next changeover to or from DST.

DST-Impact Studies

A number of studies have been conducted on DST's impact on energy savings, health, and safety. Following are some recent examples from database searches, such as EbscoHost, ProQuest, and

³ U.S. Department of Transportation (DOT), *Uniform Time*, February 13, 2015, at <https://www.transportation.gov/regulations/time-act>.

⁴ DOT, *Procedure for Moving an Area from One Time Zone to Another*, April 30, 2013, at <https://www.transportation.gov/regulations/procedure-moving-area-one-time-zone-another>.

⁵ Council of State Governments, "State-Federal Relations: Obstructive or Constructive Federalism?," September 1, 2015, <http://knowledgecenter.csg.org/kc/content/state-federal-relations-obstructive-or-constructive-federalism-0>.

ScienceDirect, including a few select sample reports that discuss the impacts of DST on the listed topic. This is not a comprehensive literature review.

Energy Savings and Cost

Federal Studies

The first national study since the 1970's was mandated by Congress and conducted by the DOE in 2006 and in 2008:

- U.S. Department of Energy (2006), *Potential Energy-Saving Impacts of Extending Daylight Saving Time: A National Assessment*:

“Total potential *electricity* savings benefits of EDST are relatively small. Total potential electrical savings of 1 Tera Watt-hour (TWh) are estimated (with an uncertainty range of ± 40 percent), corresponding to 0.4 percent per day for each day of EDST or 0.03 percent of electricity use over the year. The United States consumed 3,548 TWhs in 2004. Total potential *energy* benefits are small. Total potential primary energy savings are estimated from 7 to 26 Trillion Btu (TBtu), or 0.01 percent to 0.03 percent of total annual U.S. energy consumption.”
- U.S. Department of Energy's Report to Congress (2008), *Impact of Extended Daylight Saving Time on National Energy Consumption*:

“The total electricity savings of Extended Daylight Saving Time were about 1.3 TeraWatt-hour (TWh). This corresponds to 0.5 percent per each day of Extended Daylight Saving Time, or 0.03 percent of electricity consumption over the year.”

Sample Scholarly Journal Articles

- M.B. Aries and G.R. Newsham (2008), “Effect of Daylight Saving Time on Lighting Energy Use: A Literature Review,” *Energy Policy*, 36(6), 1858–1866.

“The principal reason for introducing (and extending) daylight saving time (DST) was, and still is, projected energy savings, particularly for electric lighting. This paper presents a literature review concerning the effects of DST on energy use. Simple estimates suggest a reduction in national electricity use of around 0.5%, as a result of residential lighting reduction. Several studies have demonstrated effects of this size based on more complex simulations or on measured data. However, there are just as many studies that suggest no effect, and some studies suggest overall energy penalties, particularly if gasoline consumption is accounted for. There is general consensus that DST does contribute to an evening reduction in peak demand for electricity, though this may be offset by an increase in the morning. Nevertheless, the basic patterns of energy use, and the energy efficiency of buildings and equipment have changed since many of these studies were conducted. Therefore, we recommend that future energy policy decisions regarding changes to DST be preceded by high-quality research based on detailed analysis of prevailing energy use, and behaviours and systems that affect energy use. This would be timely, given the extension to DST underway in North America in 2007.”
- M.J. Kotchten (2011), “Does Daylight Saving Time Save Energy? Evidence from a Natural Experiment in Indiana,” *The Review of Economics and Statistics*, 93(4): 1172–1185.

“Our main finding is that, contrary to the policy’s intent, DST increases electricity demand.”

Safety

- A. Huang and D. Levinson (2010), “The Effects of Daylight Saving Time on Vehicle Crashes in Minnesota,” *Journal of Safety Research*, 41 (6), 513-520:

“Our major finding is that the short-term effect of DST on crashes on the morning of the first DST is not statistically significant.”

- T. Lahti et al. (2010). “Daylight Saving Time Transitions and Road Traffic Accidents,” *Journal of Environmental and Public Health*, 657167:

“Our results demonstrated that transitions into and out of daylight saving time did not increase the number of traffic road accidents.”

Health

- Y. Harrison (2013), “The Impact of Daylight Saving Time on Sleep and Related Behaviours,” *Sleep Medicine Reviews*, 1(4), 285-292:

“The start of daylight saving time in the spring is thought to lead to the relatively inconsequential loss of 1 hour of sleep on the night of the transition, but data suggest that increased sleep fragmentation and sleep latency present a cumulative effect of sleep loss, at least across the following week, perhaps longer. The autumn transition is often popularised as a gain of 1 hour of sleep but there is little evidence of extra sleep on that night. The cumulative effect of five consecutive days of earlier rise times following the autumn change again suggests a net loss of sleep across the week. Indirect evidence of an increase in traffic accident rates, and change in health and regulatory behaviours which may be related to sleep disruption suggest that adjustment to daylight saving time is neither immediate nor without consequence.”

- MR Jiddou et al. (2013). “Incidence of Myocardial Infarction with Shifts to and From Daylight Savings Time,” *The American Journal of Cardiology*, 111(5), 631-5:

“Limited evidence suggests that Daylight Saving Time (DST) shifts have a substantial influence on the risk of acute myocardial infarction (AMI). Previous literature, however, lack proper identification necessary to vouch for causal interpretation. We exploit Daylight Saving Time shift using non-parametric regression discontinuity techniques to provide indisputable evidence that this abrupt disturbance does affect incidence of AMI.”

What Federal Legislation Has Been Introduced Related to DST?

P.L. 109-58, the Energy Policy Act of 2005 (introduced as H.R. 6), was enacted on August 8, 2005. Section 110 of this act amended the Uniform Time Act, changing the beginning of DST to the second Sunday in March and the ending date to the first Sunday in November. This is the only bill related to DST that has been enacted since 1966.

Between the 95th and 109th Congresses, there were generally a few DST-related bills introduced each Congress. None of the bills were enacted. Illustrative examples include the following:

108th Congress

H.R. 1646—To amend the Uniform Time Act of 1966 to modify the State exemption provisions for advancement of time.

107th Congress

H.R. 4212—To direct the Secretary of Energy to conduct a study of the effects of year-round daylight saving time on fossil fuel usage.

106th Congress

H.R. 3756—To establish a standard time zone for Guam and the Commonwealth of the Northern Mariana Islands, and for other purposes.

102nd Congress

S. 1999—Daylight Savings Time Amendments Act of 1991

Amends the Uniform Time Act of 1966 to extend the period of daylight savings time from the last Sunday of October to the first Sunday in November.

95th Congress

H.R. 2636—A bill to amend the Uniform Time Act of 1966 to provide for permanent year-round daylight savings time.

Where Can I Find More Information on DST?

The Department of Transportation, Office of the General Counsel, oversees and regulates DST.⁶ The Naval Observatory⁷ also has useful information as does NASA.⁸

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⁶ See <https://www.transportation.gov/regulations/daylight-saving-time>.

⁷ U.S. Naval Observatory, Astronomical Applications Department, *Daylight Time*, at http://aa.usno.navy.mil/faq/docs/daylight_time.php.

⁸ National Aeronautics and Space Administration (NASA), *Daylight Saving Time*, at <http://eclipse.gsfc.nasa.gov/SEhelp/daylightsaving.html>.