State of Illinois

Department of Employment Security

The Illinois Labor Market Review

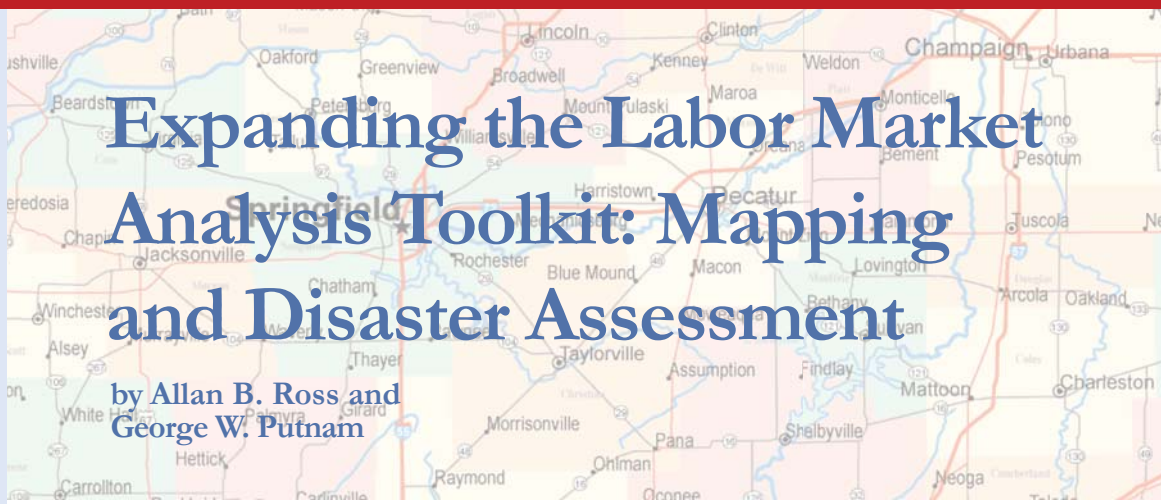
Your Source For Illinois Labor Market Information

IN THIS ISSUE:

ONE SOURCE WORKFORCE & CAREER INFORMATION

THE ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY

Illinois Labor
Market Review
June 2009



Expanding the Labor Market Analysis Toolkit: Mapping and Disaster Assessment

by Allan B. Ross and
George W. Putnam

Table of Contents

View our Labor Market Information online at www.ILWorkInfo.com

Contact: des.lmi@illinois.gov

Note: The information contained in this publication is subject to change without notice. For the latest information visit the IDES Web site at www.ides.state.il.us.

Analyses of disasters typically provide estimates of casualties and property damage, but rarely address disruptions to labor markets. Even though business interruptions caused by disasters impact workers' income, business productivity, and tax revenues, little information has been available on disaster assessment from a labor market perspective.

A major impediment has been the lack of flexibility in labor market information for geographic specificity. In the past, such information was available only for larger geographic configurations, such as states, metropolitan areas or counties. Not surprisingly, natural disasters do not often coincide with these geographies.

The states and the U S Census Bureau participate in a partnership, the Local Employment Dynamics (LED) program, which develops innovative statistical products for the study of workers and businesses in labor markets. One of these products is OnTheMap (OTM), a Web-based application offering unprecedented flexibility to generate local labor market information.[1] This flexibility makes it possible to produce useful information about workers and jobs in surface areas that closely conform to small or large areas affected by disasters.

Each of the Local Employment Dynamics products can be accessed, without cost and without a requirement to register, through the Illinois Department of Employment Security's LMI Source Web site, **http://lmi.ides.state.il.us**. For OnTheMap, the following links are available:

- The OnTheMap product. The Census Bureau recommends using a computer equipped with at least 1GB of RAM, a high performance graphics card, and a monitor capable of displaying higher resolution graphics.
- A Census Bureau publication, "Getting Started with OnTheMap Version 3," which presents instructions for using OTM.
- A recording of a Webinar sponsored by the Employment and Training Administration that introduces the use of OnTheMap to generate labor market information for disaster assessment. The recording runs for 1¼ hours.
- An IDES publication, "Disaster Assessment: A Labor Market Perspective," which presents a detailed method for using OTM to generate labor market information for disaster assessment and features a step-by-step guide on the use of the OTM features and tools.

OTM aggregates data for user-defined areas from one or more Census Blocks, the smallest geographical area for which the Census Bureau tabulates census data. Areas aggregated from Census Blocks can be made to closely correspond to disaster areas. The OTM graphical user interface displays a map from which users specify the shape of the geographical area for study. OTM data are processed by a unique disclosure proofing technique which ensures that the underlying microdata remain confidential, thus enabling release of detailed labor market information that otherwise could not be disclosed.

[1] The other LED products are QWI Online, which provides eight key economic Quarterly Workforce Indicators (QWIs), and Industry Focus, which reports the top industries in counties, metropolitan areas, and Workforce Investment Areas.

Labor Market Characteristics

OTM provides four basic categories of information: 1) worker characteristics; 2) workplace characteristics; 3) workplace location; and 4) worker residence location. The overarching power of OTM is in its flexibility to establish linkages between these categories of information. Each of the following questions may be asked about workers employed in a study area or employed residents of the area—or both.

1. **What are the workers' ages?** Younger workers are typically less attached to the labor market than are older workers, so the percentages and headcounts of younger and older workers in an area are critical for anticipating retention and recruitment issues.

2. **What are the workers' earnings?** The labor market behavior of low-wage and high-wage workers differs, and OTM reports how many workers earn more than $3,400 per month, how many earn $1,200 or less, and the percentages in each range.

3. **What industries are located in the area and how many jobs does each industry provide?** The industry mix of an area and the employment concentration within that industry mix are critical to understanding the labor market infrastructure of an impacted disaster area.

4. **What are the workers' commutation patterns?** Disasters often disrupt commuting patterns, so empirical evidence on where an area's workers live, and/or where an area's employed residents work, is critical to anticipate dislocation in the labor market.

Disaster Case Study

In order to emphasize practical use of OnTheMap, the remainder of this paper employs a case study of the labor market in an area that was severely damaged by a tornado in February 2008. The damage from this event crosses two states and affects workers who reside in three states. OnTheMap is uniquely able to work with this kind of geographic diversity.

The National Weather Service is a prime source of weather-related disaster information. This excerpt is from a National Weather Service bulletin dated 02/06/2008, which reports on a tornado that occurred on 02/05/2008.

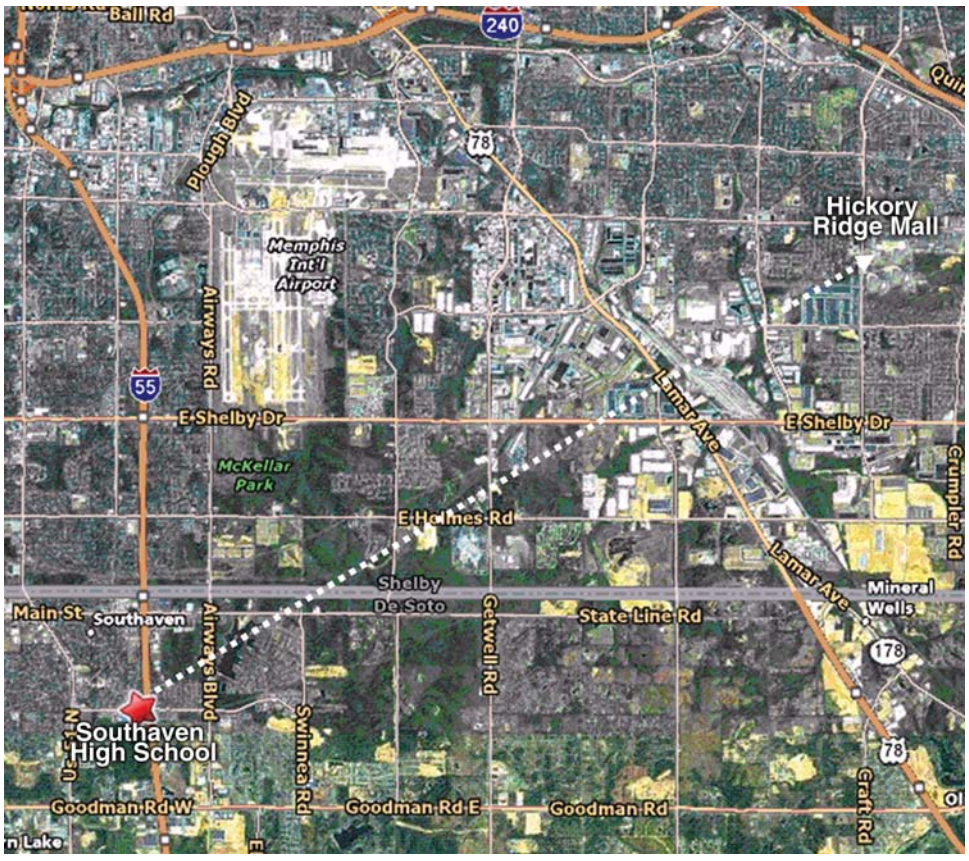
"...This tornado continued from Southaven Mississippi and proceeded northeast to near the Memphis International Airport. The tornado struck the DSC Warehouse causing the three fatalities...then continued northeast causing damage at the Hickory Ridge Mall and six additional injuries before lifting at 5:45 PM CST. The total tornado path length was 11 miles and the width was one quarter mile."

The text identifies the type of disaster (tornado), its date, time, duration, and some detail on the extent of the damage. This NWS bulletin did not give the exact starting location, but other Web sites did name the Southaven, Mississippi High School as the place where the tornado touched ground. Thus the two ends of the tornado path are known.

As stated in the National Weather Service bulletin, the tornado lifted near the Hickory Ridge Mall. The mall's Web site provided additional background on the extent of damage, and the expected length of disruption:

***"Hickory Ridge Mall Closed Due to Tornado Damage** - Hickory Ridge Mall is closed due to damages sustained by the February 5, 2008 tornado. We are eager to reopen our doors soon to serve our community. We will continue to update this site on the status of the mall with information as it becomes available."*

Map 1: Tornado Path



LEFT: Tornado's path drawn over aerial view. Aerial photography of the disaster area can inform understanding of the data. In this photo, part of the terrain appears to be industrial, and part appears to be undeveloped.

The white line drawn over the map shows the route of the tornado. Even before going into OnTheMap, we see that a small portion of the area is residential, a large portion is industrial, and that a fair amount of the territory appears relatively undeveloped.

This same geography is shown in Map 2, a screen capture from OnTheMap. We constructed a linear buffer starting at the high school and ending at the shopping center—an 11 mile distance—with a ½ mile width, per the dimensions described in the NWS bulletin.

Using Area Profile Reports

The area profile, as seen in Table 1, compares the demographics for workers employed in the tornado area to the area's employed residents.

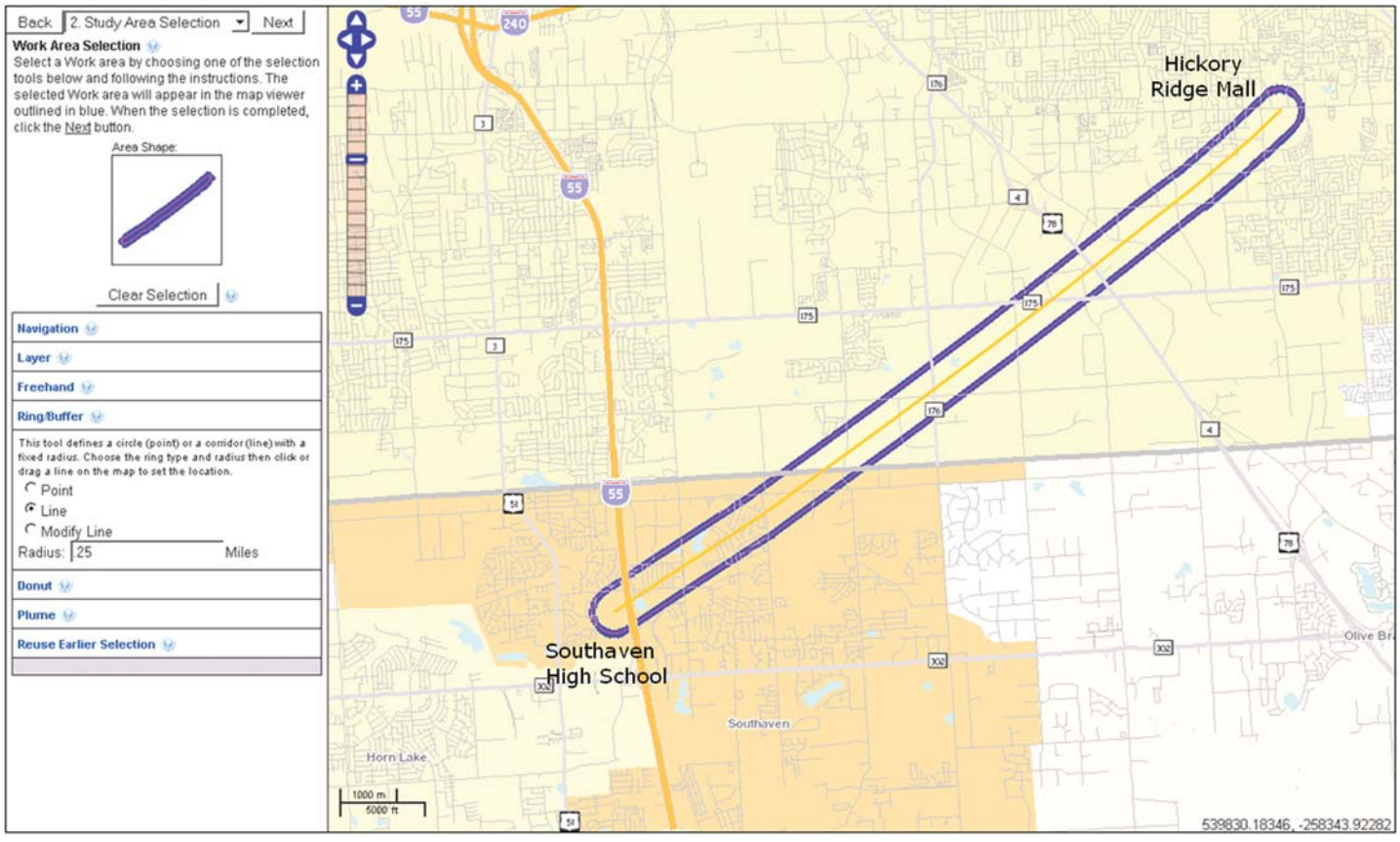
First, the number of workers employed in the area is nearly five times greater than the number of employed residents—7,137 / 1,511 persons. Recall that when performing our background analysis, the aerial view revealed a higher concentration of industrial use than residential use; these data confirm that observation. The tornado area can be said to be a net importer of workers, and an employment magnet.

Next, the worker's age characteristics show little variation between the tornado area's workers and the area's employed residents. Approximately thirty-one percent of tornado area workers are age 30 or younger, as is the case for employed residents. The middle and older ranges are also similar between these two groups of workers.

Table 1: Area Profile

	Workers Employed 2005 Q2		Employed Residents 2005 Q2	
Characteristics	**Count**	**Share**	**Count**	**Share**
Total Private Primary Jobs	7,137	100.0%	1,511	100.0%
Jobs by Worker Age				
Age 30 or Younger	2,267	31.8%	477	31.6%
Age 31 to 54	3,915	54.9%	823	54.5%
Age 55 or older	955	13.4%	211	14.0%
Jobs by Earnings Paid				
$1,200 per mo. Or less	1,950	27.3%	332	22.0%
$1,201 to $3,400 per mo.	3,261	45.7%	769	50.9%
More than $3,400 per mo.	1,926	27.0%	410	27.1%
Jobs by Industry Type (2-digit NAICS)				
Manufacturing	1,975	27.7%	180	11.9%
Retail Trade	1,546	21.7%	203	13.4%
Accom and Food Services	821	11.5%	235	15.6%
Other Services	2,745	39.1%	893	59.3%

Map 2: Area Selected for Analysis, Corresponding to Tornado Path



Third, a slightly higher proportion of the area's workers earn less than the employed residents; 27.3% of the workers earn no more than $1,200 per month, while 22.0% of the employed residents are in that range. Less than half of the workers' earnings are in the $1,201 - $3,400 range, while slightly more than half of the employed residents are in that range.

Finally, the top three industries for both the tornado area's workers and the area's employed residents were Manufacturing, Retail Trade, and Accommodation & Food Service. However, those three industries accounted for 60.9% of the workers' jobs, but only 40.9% of the employed residents' jobs. Moreover, Manufacturing provided 27.7% of the area's jobs, whereas only 11.9% of the employed residents work in that industry. There is a greater concentration of area's jobs in Retail Trade, which is not surprising given the endpoint of the tornado is a shopping mall.

Using a more refined perspective, we shift focus to area segments of workers employed in the tornado area by comparing area profiles of workers whose jobs are located in different locales of the tornado area. The mall area is compact with a fair degree of employment concentration, and, consequently, one would reasonably expect that its labor market characteristics would differ from the rest of the area. In an effort to highlight these potential differences, we partitioned the entire tornado path into two regions: the mall and the tornado path *except for* the mall.

The data confirm our expectation for significant differences between the shopping center labor market and the tornado area outside the shopping center, as can be seen in Table 2. First, although the mall occupies only a tiny portion of the tornado area, it hosts 2,380 of 7,137 (33.3%) of the area's workers.

Next, mall workers are distinctly younger (52.1% are age 30 or younger, compared to 21.6% of their counterparts in nearby damaged areas).

Mall workers are paid less. 57.7% earn $1,200 or less per month, compared to 12.1% for workers in the other segment of the tornado path. What accounts for this age and earnings difference? One factor is the industry infrastructure in these two regions.

Eighty percent of the mall workers are employed in just two industries, Retail Trade and Accommodation/Food Services; only 10% of the workers in the outlying area of the tornado path work in those industries. Businesses in these two industries tend to employ younger employees and offer lower pay.

"OTM can answer questions about workers ages, workers earnings, the industries and employment in a study area, and workers commuting patterns."

Table 2: Workers Employed

	Entire Tornado Path 2005 Q2		Hickory Ridge Mall 2005 Q2		Tornado Path Except Mall 2005 Q2	
Characteristics	**Count**	**Share**	**Count**	**Share**	**Count**	**Share**
Total Private Primary Jobs	7,137	100.0%	2,380	100.0%	4,757	100.0%
Jobs by Worker Age						
Age 30 or younger	2,267	31.8%	1,239	52.1%	1,028	21.6%
Age 31 to 54	3,915	54.9%	855	35.9%	3,060	64.3%
Age 55 or older	955	13.4%	286	12.0%	669	14.1%
Jobs by Earnings Paid						
$1,200 per month or less	1,950	27.3%	1,374	57.7%	576	12.1%
$1,201 to $3,400 per month	3,261	45.7%	855	35.9%	2,406	50.6%
More than $3,400 per month	1,926	27.0%	151	6.3%	1,775	37.3%
Jobs by Industry Type (2-digit NAICS)						
Manufacturing	1,975	27.7%	1	0.0%	1,974	41.5%
Retail Trade	1,546	21.7%	1,155	48.5%	391	8.2%
Accom. and Food Services	821	11.5%	740	31.1%	81	1.7%
All Other Industries	2,795	39.1%	484	20.2%	2,311	48.6%

Outside the mall, 41.1% of the workers are employed in Manufacturing - an industry that typically pays higher compensation. In contrast, none of the mall workers are employed in Manufacturing.

Using Shed Reports

Now we'll consider OnTheMap's other type of analytic report, the shed report, shown in Table 3. Most of the area's workers (59.8%) live in Memphis, Tennessee, and most of the area's resident workers (52.0%) are employed in this city. However the area's workers live in areas more dispersed across other cities and towns, whereas 15.0% of the area's residents work in a single town, Southaven, Mississippi.

Using Maps

Map 3, on the next page, presents a network of points depicting the Labor Shed. Each point represents a range of the number of tornado area workers who live in a Census Tract. This map shows that area workers travel to work from a broad area. The scale to the left of the map shows the range of workers represented by points of various sizes. Larger and darker points imply higher concentrations of workers' residences.

Map 4 also presents a network of points, but these represent ranges of the number of tornado area resident workers who work in a Census Tract (the Commute Shed). This map shows that area employed residents work in a few concentrated locations.

Viewed together, these maps suggest considerably different commuting patterns for travel between home and work for area workers and area employed residents. Area workers travel to work from a broad expanse, whereas area employed residents work in only a few locales. This observation complements the findings in the comparative shed report, and underscores the value of consistent presentation of information in OTM, whether the user views the tabular or graphic data.

Conclusion

OTM can answer questions about worker's ages, worker's earnings, the industries and employment in a study area, and worker's commuting patterns. And it can provide this information for geographic study areas defined with unprecedented flexibility. This article has focused on one type of disaster, but OTM can easily accommodate the various types of disasters that affect areas of different shapes. For example, hurricanes, earthquakes, and toxic gas releases generally affect broad areas, while tornados and floods affect long, relatively narrow, linear areas.

The tornado area stretching from Southaven High School, MS to Hickory Ridge Mall, TN is clearly a net importer of workers. The workers employed in the study area exceed the area's employed residents by a ratio of nearly 5:1. The age and earnings characteristics of these two groups reveal only minor differences. The employment pattern by industry sector, though, is dissimilar. Workers employed in the disaster area are more heavily concentrated in Manufacturing whereas employed residents have a higher percentage in Retail Trade.

In addition, the commutation pattern of workers in these groups differs. Workers employed in the disaster area travel to work from a dispersed distribution of home locations. Employed residents, on the other hand, work in a small number of areas.

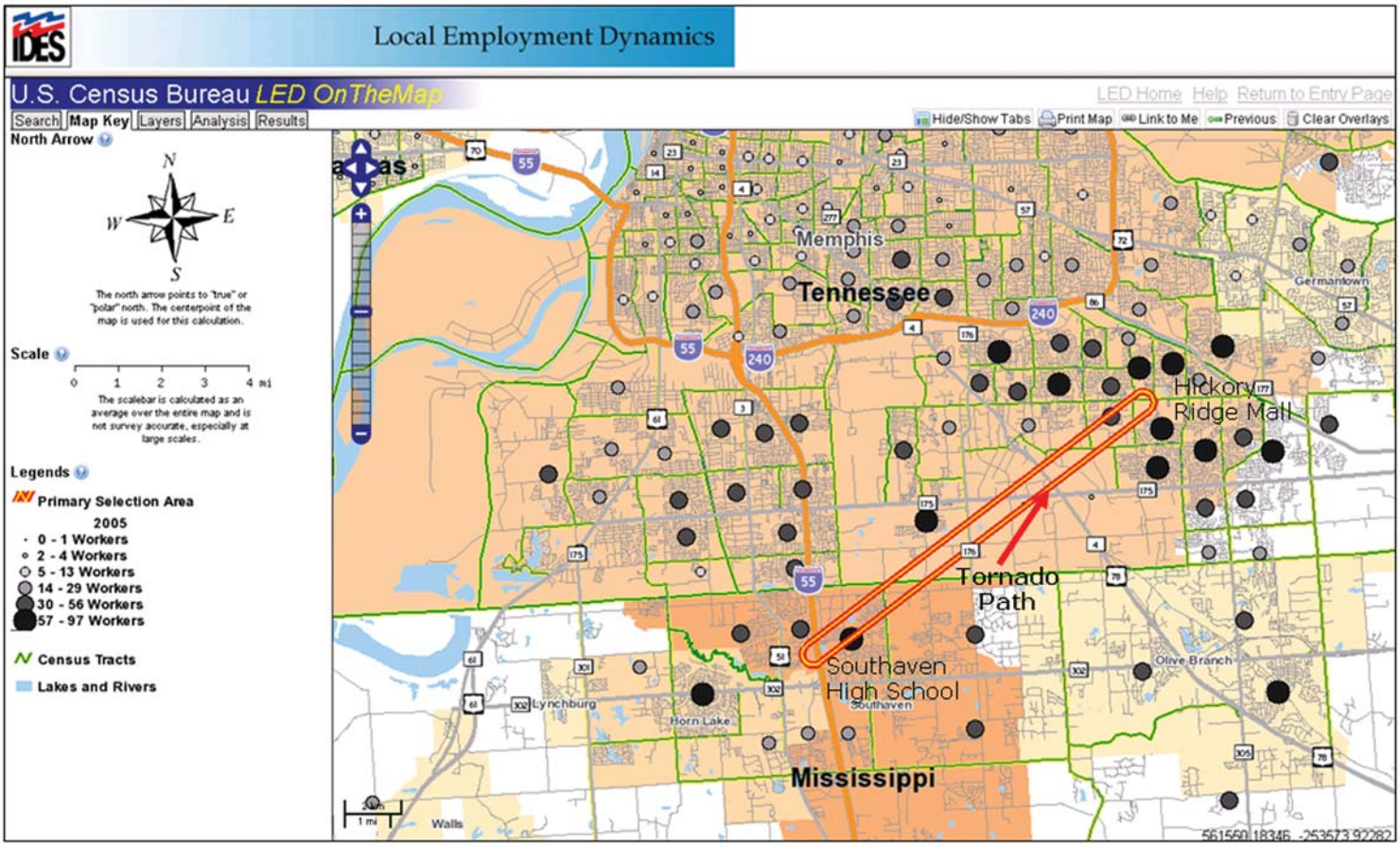
The power of OTM is, perhaps, most evident in its ability to delineate regional segments within the tornado path. That made it possible to differentiate the labor market characteristics of workers employed in the Hickory Ridge Mall from those employed in other regions of the tornado path. Mall workers are markedly younger, and have lower monthly earnings. Among those employed outside of the Mall region, more than forty percent are in Manufacturing.

This article used disaster assessment to demonstrate the utility of OTM for labor market studies. However, the critical consideration is the flexibility of OTM for integration of geography with labor market information. From this perspective, OTM is ideally suited to examine labor market characteristics of any geography that can be aggregated from one or more Census Blocks, including urban neighborhoods, Traffic Analysis Zones (TAZ), school districts, economic development regions, and workforce investment areas.

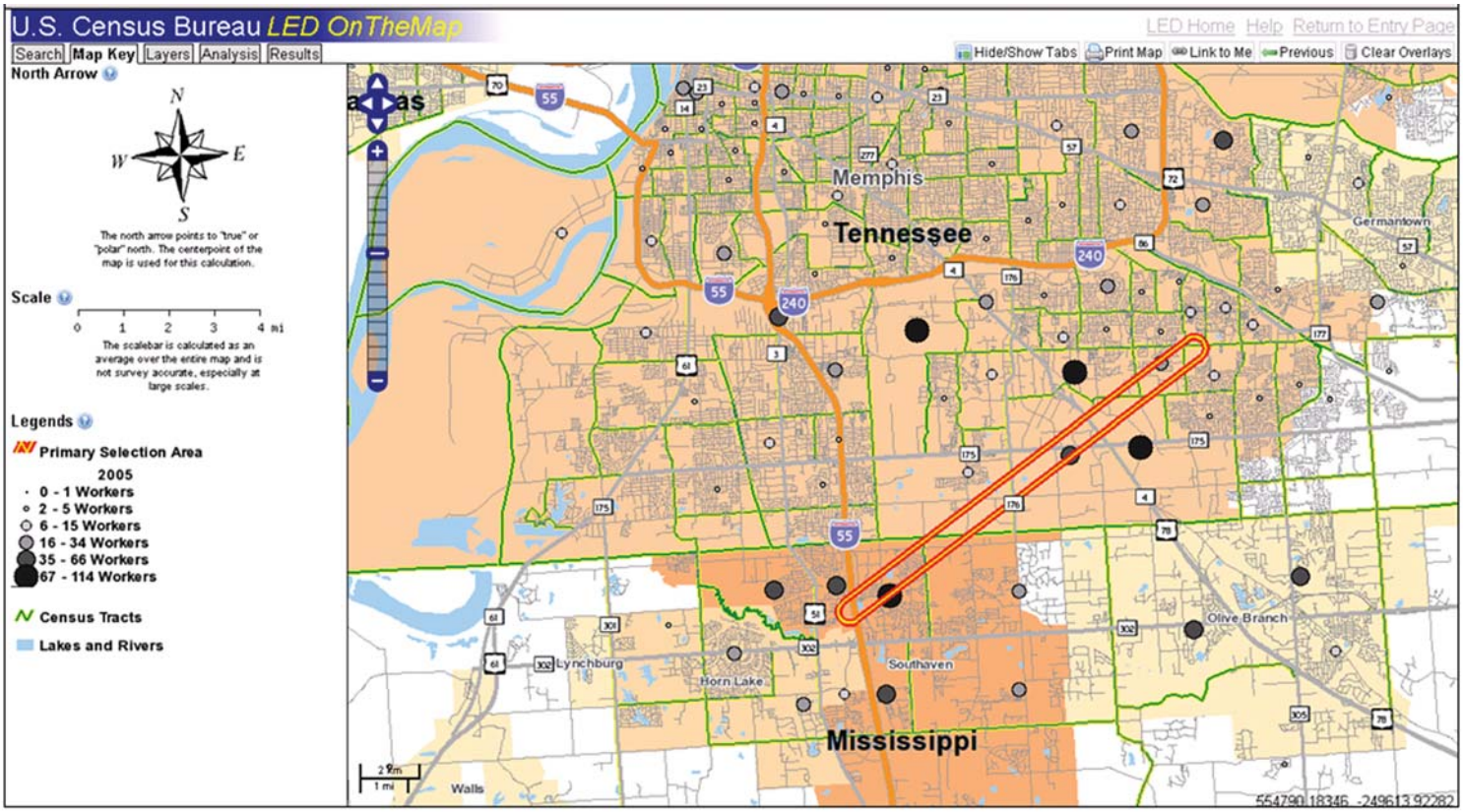
Table 3: Labor and Commute Shed Reports

	Labor Shed 2005 Q2		Commute Shed 2005 Q2	
Cities & Towns	**Count**	**Share**	**Count**	**Share**
Total Private Primary Jobs	7,137	100.0%	1,511	100.0%
Job counts in Cities/Towns				
Memphis, Tennessee	4,268	59.8%	785	52.0%
Southaven, Mississippi	224	3.1%	227	15.0%
Bartlett, Tennessee	207	2.9%	0	0.0%
Olive Branch, Mississippi	186	2.6%	97	6.4%
Collierville, Tennessee	184	2.6%	19	1.3%
Germantown, Tennessee	180	2.5%	10	0.7%
Horn Lake, Mississippi	106	1.5%	50	3.3%
Nashville-Davidson (balance), Tennessee	101	1.4%	0	0.0%
Hernando, Mississippi	38	0.5%	21	1.4%
West Memphis, Arkansas	35	0.5%	12	0.8%
All Other Locations	1,608	22.5%	290	19.2%

Map 3: Labor Shed: Where Tornado Area Workers Live



Map 4: Commute Shed: Where Tornado Area Residents Work



Looking Beyond the Official Unemployment Statistics: Alternative Measures of Labor Underutilization

by Rich Reinhold

As the economy continues to worsen, both the general public and policy makers have shown renewed interest about who is and is not included in the official unemployment statistics. Questions have also been raised as to whether the official unemployment rate is the best indicator to measure the impact of the economic recession. This article will discuss who is included in the official unemployment statistics and also present alternative measures of labor underutilization, published by the U.S. Bureau of Labor Statistics (BLS), which can enhance our analysis of the labor force.

Who is Officially Counted as Employed and Unemployed?

The national unemployment rate is developed from a monthly survey of about 60,000 households conducted by the U.S. Census Bureau for the BLS, known as the Current Population Survey (CPS). Each member of the household who is at least 16 years old is classified into one of three categories: employed, unemployed or not in the labor force.

The employed include anyone who did work as paid employees, worked in their own business or was temporarily away from work due to reasons such as illness, vacation or a labor dispute. Those who worked at least 15 unpaid hours in a family business or enterprise are also counted as employed. Individuals who are employed at least 35 hours per week are considered full-time workers. The employed also include those who are working part-time for economic reasons.

The unemployed include anyone who is without a job but is available and actively looking for work sometime during the four-weeks prior to the period they are surveyed. The job search must include specific behavior that demonstrates the person is actively looking for work, such as participating in job interviews or job fairs. An active job search does not include what are considered to be passive types of behavior such as browsing job advertisements. Those who are on layoff but expecting to be recalled by their employer do not need to look for work to be counted as unemployed. Unemployed is further broken down by reasons for unemployment including: job losers (both permanent and temporary), persons who completed temporary jobs, job leavers and labor force reentrants and new entrants. Also, it is important to note that one does not need to be collecting Unemployment Insurance benefits to be classified as unemployed.

The labor force is defined as the sum of employed and unemployed. The unemployment rate is the number of unemployed, expressed as a percentage of the labor force (or unemployed/labor force x 100).

People Not Counted as Employed or Unemployed

Those who are neither classified as employed nor unemployed are considered to be not in the labor force. The most common examples of people outside the labor force are retirees, students and homemakers. However, there is also a category of people who are classified as marginally attached to the labor force. These individuals want a job, are available for work but have stopped looking for work due to reasons such as child care problems, school, family responsibilities or lack of transportation. One must also have looked for work sometime during the previous 12 months to be classified as marginally attached to the labor force.

Discouraged workers are a sub-group of those marginally attached to the labor force. This group includes people who have given up their job search because they think that no jobs are available for them or barriers to work exist such as lack of education, training, skills or discrimination due to age, race or other characteristics.

Alternative Measures of Labor Underutilization

For many years six separate alternative measures of labor underutilization, including the official unemployment rate, have been published at the national level. These measures are also sometimes referred to as "U-rates." In March 2009, the U.S. BLS released 2007 and 2008 alternative measures for all 50 states using data from the CPS. Visit **http://www.bls.gov/lau/stalt.htm** for more information. Currently, the alternative measures published

Table 1: Annual Illinois Alternative Measures of Labor Underutilization

Year	U-1	U-2	U-3	U-4	U-5	U-6
1998	1.3	2.1	4.5	4.8	5.4	7.5
1999	1.2	2.0	4.3	4.5	5.1	6.9
2000	1.0	2.0	4.3	4.5	5.2	7.2
2001	1.5	2.8	5.4	5.6	6.4	8.7
2002	2.5	3.8	6.5	6.8	7.5	10.0
2003	2.8	4.1	6.7	7.0	7.8	10.7
2004	2.6	3.3	6.1	6.4	7.1	10.2
2005	2.4	3.1	5.6	5.9	6.7	9.6
2006	1.8	2.4	4.5	4.7	5.3	8.1
2007	1.9	2.7	5.1	5.4	5.9	8.6
2008	2.6	3.6	6.6	6.9	7.6	11.7

Source: U.S. Bureau of Labor Statistics, Current Population Survey, data subject to revision

by the BLS for states are restricted to calendar year and four-quarter averages. Monthly state-level data from the CPS do not meet BLS publication standards due to the small household sample sizes. However, readers should be aware that even annual or four-quarter average CPS data at the state-level can be subject to relatively large changes because of sampling error.

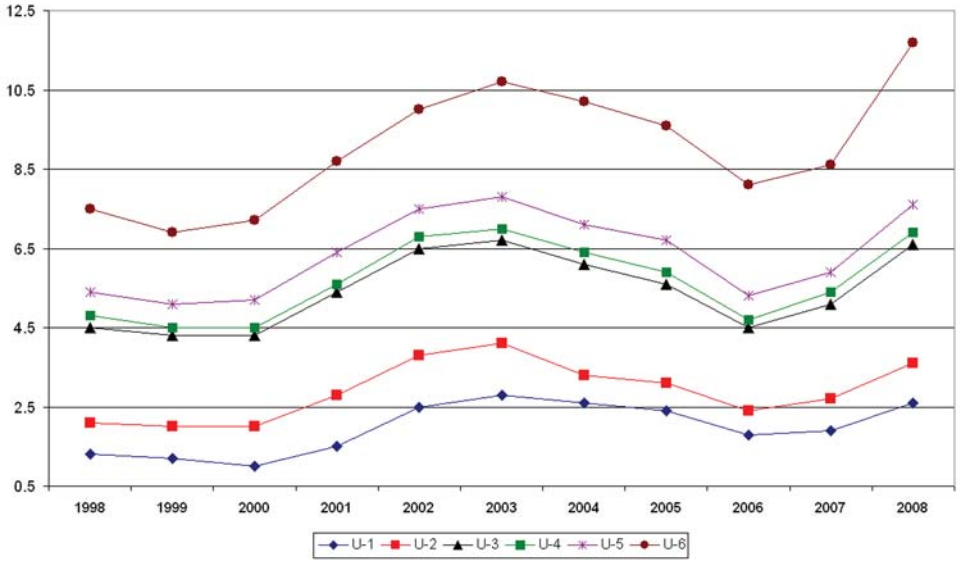
Table 1 shows 1998-2008 alternative measures for Illinois. The alternative measures are defined as follows:

- U-1, persons unemployed 15 weeks or longer as a percent of the labor force.
- U-2, job losers and those who completed temporary jobs, as a percent of the labor force.
- U-3, total unemployed, as a percent of the labor force. This is the same definition as the official unemployment rate.
- U-4, total unemployed, plus discouraged workers as a percent of the labor force.
- U-5, total unemployed, plus discouraged workers, plus all marginally attached workers, as a percent of the labor force plus all marginally attached workers.
- U-6, total unemployed, plus all marginally attached workers, plus total employed part-time for economic reasons as a percent of the labor force plus all marginally attached workers.

How do Alternative Measures of Labor Underutilization Compare and Change Over Time?

As Chart 1 shows, each of the alternative measures move in the same direction during periods of economic growth and decline. The U-3 (the unemployment rate) and U-4 (unemployed plus discouraged workers) rates were very close in terms of actual percentages and virtually identical in the size of annual change. The U-6 rate reported its largest annual increase in 2008, rising 3.1 points to 11.7 percent. However, this was not surprising given that U-6 includes the broadest definition among all measures and is more sensitive to changes in the economy, particularly increases in the number of people employed part-time for economic reasons. We also examined the ratio of the U-6 rate to the unemployment rate and found that it had remained stable over the years, rising only slightly in 2008 (from 1.7 to 1.8) as the economy declined.

Chart 1: Illinois Annual Alternative Measures of Labor



The annual unemployment (U-3) rates cited here are taken from the CPS and may not match the official annual unemployment rates produced by BLS state labor force models. For example, the 2008 Illinois unemployment rate from the CPS was 6.6 percent and the official Illinois model-based 2008 unemployment rate was 6.5 percent. A report including official, annual 2008 unemployment rates for all states can be found at **http://www.bls.gov/lau/lastrk08.htm**.

Illinois Compared to the Nation

During most of the past eight years, the U-6 rate has been slightly higher in Illinois as compared to the U.S (see Table 2 and Chart 2). But in 2008, the increase in the U-6 rate for Illinois was nearly 1.0 point higher than the increase nationwide. For the past four years, we have seen larger annual changes in Illinois for nearly all alternative measures, including the unemployment rate and U-6 rate, as compared to the nation.

Illinois Compared to Other States

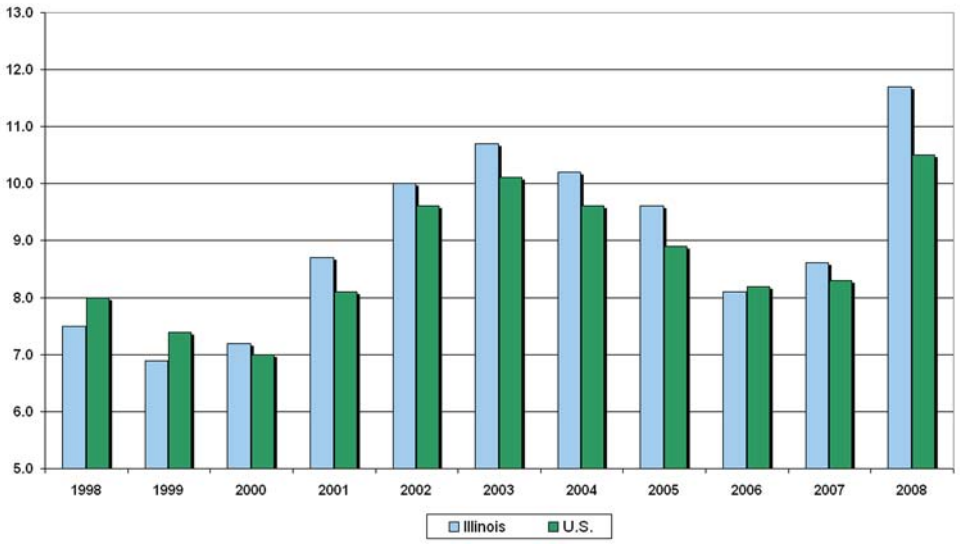
States with the highest unemployment rates also had the highest U-6 rates; the reverse was true for states with low unemployment rates. In 2008, Illinois had the sixth highest unemployment rate and the eighth highest U-6 rate among all states (see Table 3, next page). Michigan had both the highest unemployment and U-6 rates. Wyoming was tied with South Dakota for the lowest unemployment rate and had the lowest U-6 rate. Rhode Island reported the largest increases in both unemployment and U-6 rates between 2007 and 2008 (see Table 4, next page). Illinois was tied with Delaware and Nevada for the 11th largest annual increase in the unemployment rate and had the eighth largest annual increase in the U-6 rate. Finally, it should be noted that the annual average unemployment rates do not fully reflect the labor market deterioration in 2008. In most states, unemployment began to rise sharply during mid-year 2008.

Table 2: Annual Unemployment Rates (U-3) and U-6 Rates for Illinois and the United States

Year	Illinois Unemployment Rate *	Illinois U-6	United States Unemployment Rate	United States U-6
1998	4.5	7.5	4.5	8.0
1999	4.3	6.9	4.2	7.4
2000	4.3	7.2	4.0	7.0
2001	5.4	8.7	4.7	8.1
2002	6.5	10.0	5.8	9.6
2003	6.7	10.7	6.0	10.1
2004	6.1	10.2	5.5	9.6
2005	5.6	9.6	5.1	8.9
2006	4.5	8.1	4.6	8.2
2007	5.1	8.6	4.6	8.3
2008	6.6	11.7	5.8	10.5

*Annual unemployment rate reported in the Current Population Survey. May differ from official, model-based annual 2008 unemployment rates
Source: U.S. Bureau of Labor Statistics, Current Population Survey, data subject to revision

Chart 2: Annual U-6 Rates for Illinois and the United States



Alternative Measures of Labor Underutilization and Unemployment Rates

The alternative measures of labor underutilization should not be viewed as alternative unemployment rates. The U-6 rate is sometimes called the "real" unemployment rate. However, the official unemployment rate is intended to be an indicator of available labor supply and not a measure of economic hardship. The U-1, U-2, U-4, U-5 and U-6 rates could be thought of as alternative measures describing various levels of weakness in the labor force but are not directly comparable to the unemployment rate.

For more information, please contact
Rich Reinhold at Richard.Reinhold@Illinois.gov or 312.793.5896

Table 3: 2008 Annual Unemployment Rates and U-6 Rates by State with Rankings (in Decending Order)

State	2008 Unemployment Rate *	Rank	U-6	Rank
Alabama	5.6	21	9.8	27
Alaska	6.8	4	12.0	6
Arizona	5.9	19	10.7	17
Arkansas	5.2	30	10.2	23
California	7.1	3	13.4	2
Colorado	4.8	35	9.2	31
Connecticut	5.7	20	10.3	21
Delaware	5.0	32	9.0	35
District of Columbia	6.6	6	10.0	26
Florida	6.1	15	11.9	7
Georgia	6.4	11	11.1	13
Hawaii	4.2	41	8.8	38
Idaho	5.4	24	10.4	19
Illinois	**6.6**	**6**	**11.7**	**8**
Indiana	6.0	18	10.6	18
Iowa	4.0	43	7.6	44
Kansas	4.5	38	7.8	40
Kentucky	6.3	14	10.8	16
Louisiana	5.0	32	7.8	40
Maine	5.4	24	10.9	15
Maryland	4.2	41	7.8	40
Massachusetts	5.3	27	9.0	35
Michigan	8.3	1	15.1	1
Minnesota	5.5	22	10.2	23
Mississippi	6.5	9	11.2	12
Missouri	6.1	15	10.1	25
Montana	5.2	30	10.3	21
Nebraska	3.3	48	6.1	49
Nevada	6.1	15	11.1	13
New Hampshire	3.8	45	7.8	40
New Jersey	5.4	24	9.5	29
New Mexico	4.4	39	8.9	37
New York	5.5	22	9.6	28
North Carolina	6.4	11	11.3	11
North Dakota	3.2	49	6.1	49
Ohio	6.5	9	11.4	9
Oklahoma	3.7	46	6.5	46
Oregon	6.4	11	12.6	4
Pennsylvania	5.3	27	9.3	30
Rhode Island	7.9	2	13.2	3
South Carolina	6.7	5	12.1	5
South Dakota	3.0	50	6.2	47
Tennessee	6.6	6	11.4	9
Texas	4.8	35	9.1	32
Utah	3.5	47	6.2	47
Vermont	4.9	34	9.1	32
Virginia	4.0	43	7.5	45
Washington	5.3	27	10.4	19
West Virginia	4.4	39	9.1	32
Wisconsin	4.7	37	8.6	39
Wyoming	3.0	50	5.7	51

Table 4: Annual Change in Unemployment Rates and U-6 Rates with Rankings (in Ascending Order)

State	2008 Unemployment Rate *	2007-2008 Change	Rank	2008 U-6 Rate	2007-2008 Change	Rank
Alabama	5.6	1.6	10	9.8	2.7	11
Alaska	6.8	0.6	38	12.0	0.5	39
Arizona	5.9	2.0	4	10.7	3.3	6
Arkansas	5.2	-0.4	50	10.2	0.5	39
California	7.1	1.8	8	13.4	3.4	5
Colorado	4.8	1.1	21	9.2	1.8	22
Connecticut	5.7	1.2	17	10.3	1.9	21
Delaware	5.0	1.5	11	9.0	2.5	14
District of Columbia	6.6	1.1	21	10.0	0.6	38
Florida	6.1	2.0	5	11.9	3.8	3
Georgia	6.4	2.1	3	11.1	3.0	9
Hawaii	4.2	1.3	15	8.8	2.4	17
Idaho	5.4	2.4	2	10.4	4.2	2
Illinois	**6.6**	**1.5**	**11**	**11.7**	**3.1**	**8**
Indiana	6.0	1.4	14	10.6	2.7	11
Iowa	4.0	0.3	42	7.6	0.5	39
Kansas	4.5	0.4	40	7.8	0.3	44
Kentucky	6.3	0.9	31	10.8	1.5	28
Louisiana	5.0	0.7	32	7.8	0.5	39
Maine	5.4	0.7	32	10.9	1.8	22
Maryland	4.2	0.6	37	7.8	1.4	32
Massachusetts	5.3	0.7	32	9.0	1.7	25
Michigan	8.3	1.2	16	15.1	2.1	18
Minnesota	5.5	0.9	25	10.2	1.8	22
Mississippi	6.5	0.4	40	11.2	0.3	44
Missouri	6.1	1.1	21	10.1	1.6	26
Montana	5.2	1.6	9	10.3	3.0	9
Nebraska	3.3	0.2	43	6.1	0.3	44
Nevada	6.1	1.5	11	11.1	3.5	4
New Hampshire	3.8	0.2	43	7.8	1.2	36
New Jersey	5.4	1.2	17	9.5	2.1	18
New Mexico	4.4	0.7	32	8.9	1.5	28
New York	5.5	0.9	25	9.6	1.5	28
North Carolina	6.4	1.9	7	11.3	2.7	11
North Dakota	3.2	0.0	47	6.1	0.2	47
Ohio	6.5	0.9	25	11.4	1.6	26
Oklahoma	3.7	-0.7	51	6.5	-1.1	51
Oregon	6.4	1.2	17	12.6	2.5	14
Pennsylvania	5.3	1.0	24	9.3	1.5	28
Rhode Island	7.9	3.0	1	13.2	4.8	1
South Carolina	6.7	1.1	20	12.1	2.5	14
South Dakota	3.0	0.1	45	6.2	0.4	43
Tennessee	6.6	2.0	5	11.4	3.3	6
Texas	4.8	0.5	39	9.1	1.4	32
Utah	3.5	0.9	29	6.2	1.1	37
Vermont	4.9	0.9	25	9.1	2.1	18
Virginia	4.0	0.9	29	7.5	1.3	35
Washington	5.3	0.7	32	10.4	1.4	32
West Virginia	4.4	-0.2	48	9.1	-0.2	50
Wisconsin	4.7	-0.3	49	8.6	0.1	48
Wyoming	3.0	0.1	45	5.7	0.0	49

*Annual unemployment rate reported in the Current Population Survey. May differ from official, model-based annual 2008 unemployment rates.
Source: U.S. Bureau of Labor Statistics, Current Population Survey, data subject to revision

Developing a Biofuel Industry in Illinois

by Jessica Maiorca*

Illinois, like much of the United States, seeks to address two current troubling issues - rising unemployment levels and fluctuating energy costs – through one coordinated strategy. To wit, Illinois can use its natural resources, central location, geography, and current infrastructure to develop a biofuels industry that will both "green" its transportation sector and create a sustainable demand for labor. Using biofuels will lessen dependence on foreign oil, help decrease fuel price volatility, and contribute to a cleaner environment. The biofuels industry will also create sustainable jobs while stimulating related industries.

Before discussing biofuels in detail, it is important to consider the broader issue of energy efficiency in comparing biofuels with petroleum. We must recognize that (1) while we have measured petroleum in terms of efficiency, we need to measure biofuels in terms of sustainability, and (2) the development of biofuels requires the same trial-and-error process as other scientific endeavors and technological developments will only improve biofuels' efficiency.

Biofuels

Among the several types of biofuels are bioethanol ("ethanol") and biodiesel. Both are renewable, clean, and the focus of much research. Ethanol utilizes the sugars of several types of grains (corn, sorghum, wheat, etc.) and other plant "scraps" (potato skins, sugarcane stalks, yard clippings, etc.). Biodiesel utilizes the oils of vegetables (algae, jatropha, etc.), animal fats (beef tallow, pork lard, etc.), and/or grease (trap grease from restaurants and float grease from waste water treatment plants).

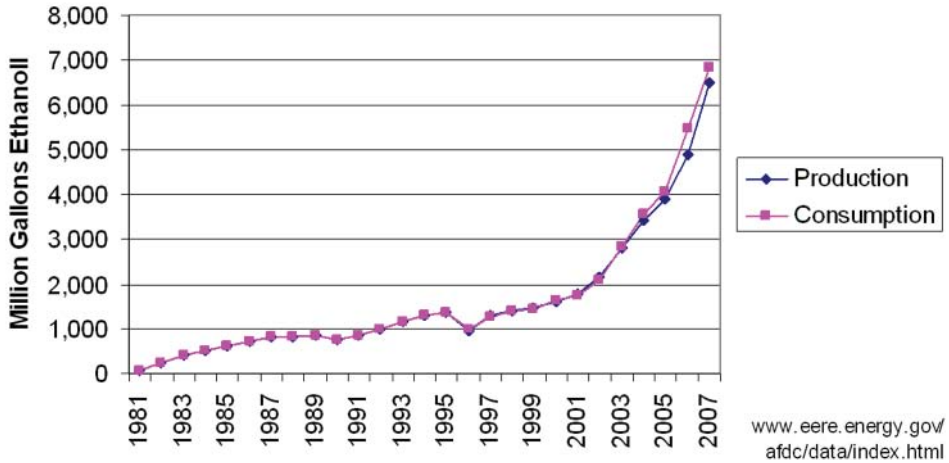
In describing biofuels, the terms "first generation" and "second generation" are used, with "first-generation" describing biofuels produced from plant matter containing oil, starch or sugar and "second-generation" describing biofuels that are cellulose-based.[1]

Ethanol

The U.S. is currently the world's largest ethanol producer with almost 200 ethanol fuel biorefineries.[2] The vast majority use corn, while all of Illinois' 15 biorefineries use corn and one also uses wheat starch.[3] United States public and private groups are currently researching and experimenting with new technologies in order to derive ethanol from several other sources including sugarcane and cellulose.

As indicated by Chart 1 below, domestic production and consumption of ethanol fuel has increased significantly in recent years.

Chart 1: U.S. Production and Consumption of Fuel Ethanol



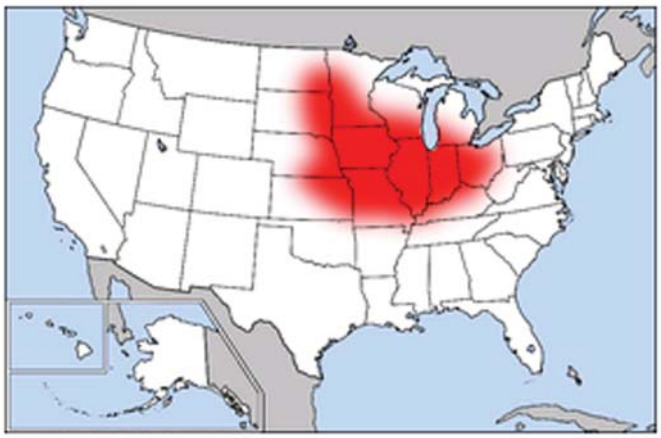
U.S. Production and Consumption of Fuel Ethanol, 1981-2007
http://www.afdc.energy.gov/afdc/data/docs/ethanol_production_consumption.xls

* Jessica Maiorca is working on her Masters Degree at Cornell University. She wrote this paper as an Intern with the Illinois Department of Employment Security, Economic Information and Analysis Division.

Corn Ethanol

Corn ethanol results from the fermentation of corn's starch into sugar, which is then fermented into alcohol. Corn ethanol's use reduces total emissions by 10-20%. [4] Corn is grown during the spring and summer months primarily within the U.S. Feed Grains and Livestock Belt (formerly known as the Corn Belt).[5] Forty-five states currently have laws encouraging corn ethanol use and production.[6] In the United States today, about 95% percent of ethanol is derived from corn. Illinois ranks second among all states in corn-based ethanol production.[7]

Map 1: U.S. Feed Grains & Livestock Belt



http://www.afdc.energy.gov/afdc/data/docs/ethanol_production_consumption.xls

Corn ethanol has largely been dismissed as a good alternative energy source. First, while corn ethanol's energy efficiency is highly debated, it is generally considered lower than that of petroleum and other forms of ethanol.

Second, there are serious land issues regarding corn's harvest. Corn uses the strongest pesticides and fertilizers of any U.S. food crop and its fertilizers have created oxygen-starved zones in the Gulf of Mexico.[8] Additionally, the Earth Policy Institute estimates that even if the country converted its entire grain harvest to corn, the resulting ethanol would satisfy only 16% of our fuel needs, while the corn used to fill a 25-gallon vehicle tank with ethanol one time would feed one person for an entire year.[9] It is also estimated that 71% of U.S. farmland would need to grow corn if the country were to replace the 200 billion gallons of petroleum-based fuel used by domestic drivers each year.[10]

Finally, corn's global value has also been a matter of frequent debate. The U.S. corn crop accounts for 40% of the global harvest. If only corn were used for ethanol production, some believe it would reduce the amount of corn available for export.[11] Additionally, if corn prices rise, the prices of other grains rise. In 2007, yellow corn on the world market hit a ten-year high partially due to ethanol's rising popularity,[12] causing many of the world's poor to be negatively impacted by a price increase of imported grains.[13]

Sugarcane Ethanol

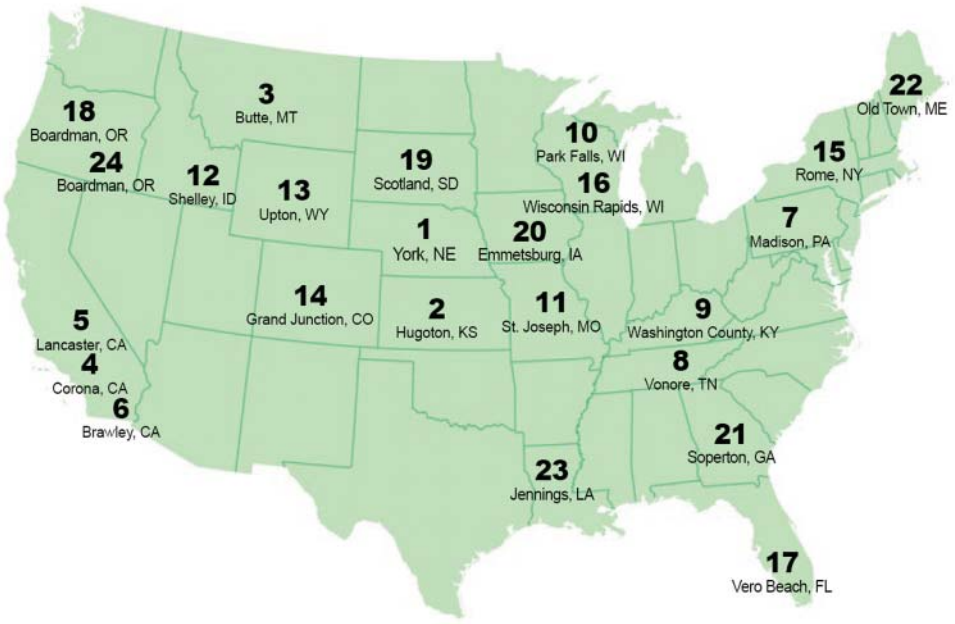
Sugarcane ethanol is derived from sugarcane. Compared to gasoline, sugarcane ethanol reduces total emissions by 90% – a figure comparable to that of second-generation biofuels. Compared to corn, it is eight times more productive and causes less soil erosion. Sugarcane is also replanted every six years, grows year round,[14] and generates a carbon credit by capturing large amounts of carbon. From its planting to use in a vehicle, sugarcane ethanol produces 9.3 units of fuel for every unit of fossil energy used. It is also argued to be " . . . the first renewable fuel to be cost-competitive with petroleum fuel for transport." [15]

As with corn ethanol, sugarcane ethanol is not as energy efficient as petroleum when burned. Also, U.S. climate is not conducive to mass growing of sugarcane, though small quantities are grown in Florida, Hawaii, Louisiana, and Texas. Brazil is by far the largest sugarcane producer. Current U.S. policy places a tariff on Brazilian sugar – a measure that both the American Sugar Alliance and corn lobbyists are fighting to maintain.[16] There are also concerns over Brazil subsidizing its sugarcane industry. Critics have pointed out that the amount of sugarcane ethanol required to provide all of the U.S.'s fuel needs exceeds Brazilian production.

Cellulosic Ethanol

Cellulosic ethanol is part of the second generation of biofuels, utilizing a variety of non-food plant waste (corncobs, saw dust, switchgrass, etc.). Compared to gasoline, cellulosic ethanol reduces total emissions by 80% and is significantly more efficient than gasoline and corn ethanol.[17] Several cellulosic inputs are native to the Midwest, making them

Map 2: U.S. Cellulosic Ethanol Projects Under Development And Construction



http://www.ethanolrfa.org/resource/cellulosic/documents/CellulosicPlantMap.pdf

easy to harvest in Illinois. However, since it is harder to break down cellulose, the production process is more complicated and expensive. Technology does not yet exist for mass production of cellulosic ethanol. Some believe that it still requires substantial subsidies and tax incentives for research and development before it can truly enter the biofuels market.[18]

As is indicated in Map 2, on the previous page, there are currently 24 cellulosic ethanol plants under development and construction in the United States. There are no cellulosic ethanol plants in Illinois. However, a 2008 New York Times article stated that General Motors was partnering with renewable energy company Coskata to build a cellulosic ethanol plant in Illinois.[19]

Other Sources of Ethanol Currently Being Researched

- Miscanthus: Native to Asia and related to sugarcane, some research indicates that miscanthus requires less acreage than corn or switchgrass and is just as productive.[20] It can also grow in marginal soil and improve it.

- Molasses: A byproduct of sugarcane, it is cost competitive with corn for ethanol.[12]

- Sorghum: Native to Africa, sorghum is currently grown in the Great Plains, Arizona, and California. Grain sorghum, or milo, can be processed into ethanol. A few U.S. ethanol plants currently use milo as an input.

- Sugar beets: Generally grown in cooler climates such as western Minnesota and eastern North Dakota, they are also grown in regions such as the Pacific Northwest, Great Plains, and the Great Lakes, as well as in warmer climates such as California.[22] Compared to sugarcane, they are easier to process into ethanol and yield more ethanol per ton.[23]

- Sweet sorghum: Also native to Africa, sweet sorghum was once cultivated in the Midwest but is now primarily planted in the Southeast. Many producers prefer sweet sorghum to sorghum because it requires less water and contains more sugar, thereby having a higher energy content. At least one U.S. sweet sorghum ethanol plant is in development.

- Switchgrass: Native to the U.S. Plains, switchgrass is extremely adaptable and grows quickly. One study estimates that switchgrass delivers 540% of the energy used to produce it.[24]

Biodiesel

Biodiesel is a renewable biofuel that is produced from the oils of vegetables, animal fat, and/or grease. Oils from soybean, rapeseed, peanuts, sunflower, and palm nuts are commonly used. Biodiesel can be mixed with regular diesel or used by itself. Biodiesel must meet American Society of Testing and Materials specifications and is the only alternative fuel to have fully completed the health effects testing requirements of the Clean Air Act.[25] Compared to petroleum diesel, biodiesel reduces carbon dioxide emissions by 78%, carbon monoxide by 48% and particulate matter by 47%.[26] Biodiesel mileage is higher than gasoline but lower than conventional diesels. Drawbacks to biodiesel include emissions and fuel-system problems at lower temperatures. Researchers are currently working to resolve these issues.[27]

There are approximately 176 biodiesel plants in the United States. Since 2001, the Illinois EPA has received permit applications for 22 new biodiesel plants and granted permits to 20. Five are currently operating. For a current map of commercial biodiesel production plants in the United States, visit the National Biodiesel Board's Web site at **www.biodiesel.org**.

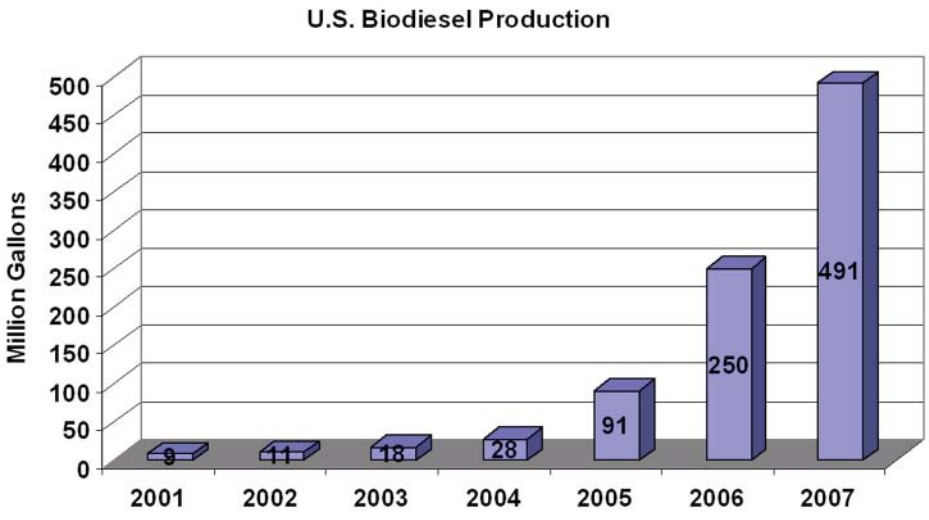
US biodiesel production has dramatically increased over the past several years, as can be seen in Chart 2.

Sources of Biodiesel Currently Being Researched

- Jatropha: Native to Africa, Asia, and the West Indies, jatropha is a plant that grows well in poor soils and produces four times more fuel per hectare than soybeans.

- Algae: Viewed by many as a key fuel for the future because it is fast growing, algae can be grown virtually anywhere and does not compete with food crops for arable land. Algae yields up to 30 times more fuel than standard energy crops, and one estimate claims algae produces 2,000 times more oil than soybeans.[28] It will be a while before biofuels from algae can be commercially competitive – some say around five years. Nevertheless, algae's potential encourages its use, and on January 8, 2009, Continental Airlines test flew a commercial jet using fuel partially derived from algae (and jatropha).[29]

Chart 2: US Biodiesel Production, 2001-2007



http://www.afdc.energy.gov/afdc/data/docs/biodiesel_production_2001_2005.xls

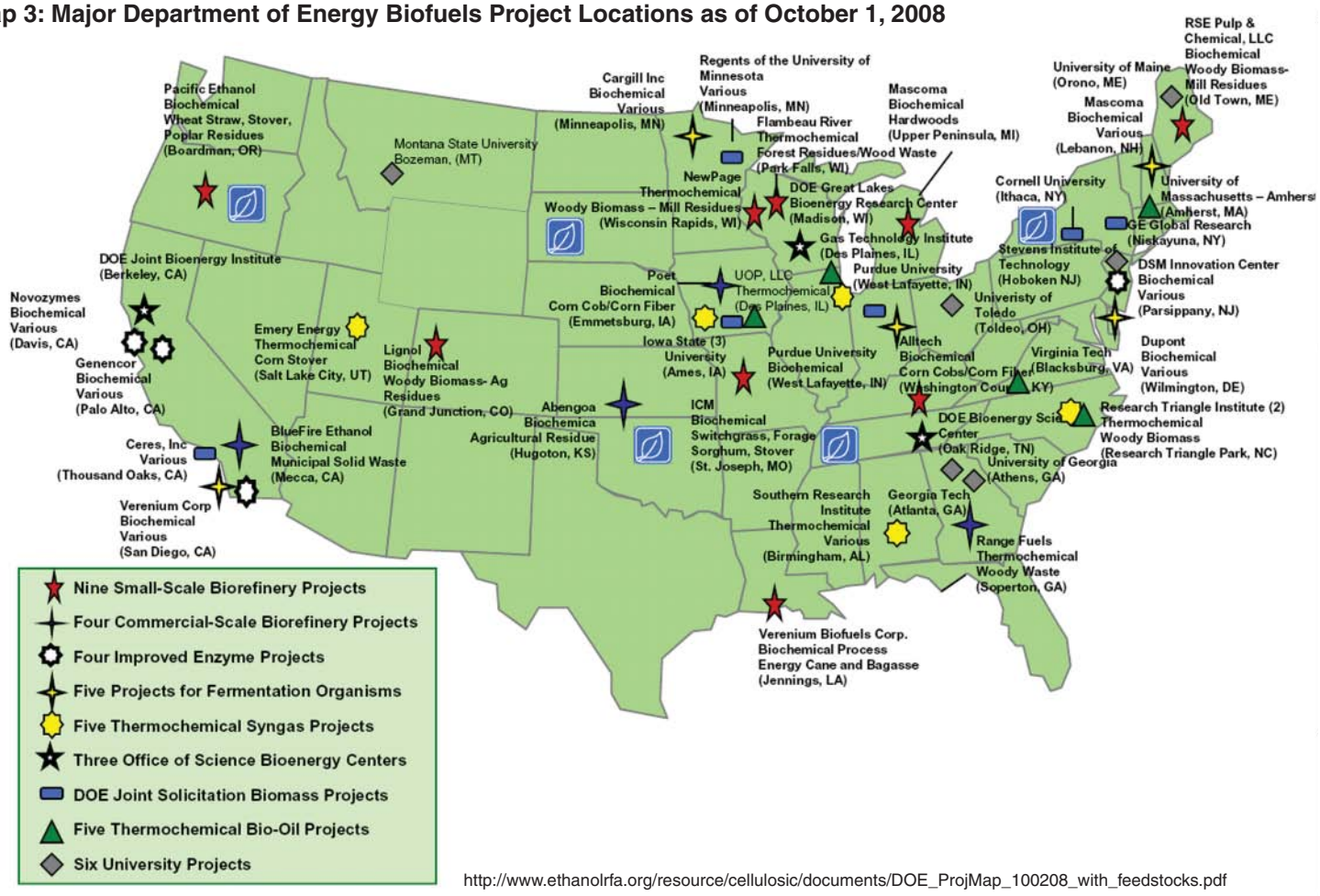
Government Policies & Initiatives

The US government is increasing its support of developing biofuels via tax credits, tariffs, acts and programs. Below is a time line of major government legislation regarding biofuels.

- 1978: The Blender's Tax Credit, valued at 51¢ per gallon, is given to those blending with ethanol.
- 1980: The Ethanol Import Tariff imposes a 54¢ per gallon tariff on imported ethanol.
- 1990: The Clean Air Act Amendments identify areas of the country that must reduce or eliminate air pollution.
- 1992: Among requirements of the Energy Policy Act, fleets must purchase a certain percentage of new vehicles that can use alternative fuels.
- 1998: The Energy Policy Act is amended to include biodiesel as an alternative fuel.
- 2001: The CCC Bioenergy Program is created, providing money to people who produce biodiesel. The program ended June 2006.[30]
- 2004: The Jobs Act provides tax credits for biodiesel blenders.[31]
- 2005: The Energy Policy Act provides tax credits for biodiesel suppliers and mandates fuel producers to phase in renewable fuels, encouraging both supply and demand. The tax credit for suppliers was set to expire at the end of 2008.[32]
- 2007: The Energy Independence and Security Act requires production of 36 billion gallons of ethanol by 2022 and establishes minimum use standards for conventional, advanced, cellulosic, and undifferentiated advanced biofuels as well as biomass-based diesel. From 2012 on, the majority of new ethanol must be "second-generation" biofuels derived from plant cellulose, municipal wastes and other crops.[33]
- 2008: The Farm Bill reduces subsidies to the ethanol industry from 51¢ per gallon to 45¢ per gallon. However, the tariff on imported sugar ethanol remains at 54¢ per gallon.[34]
- 2008: The U.S. Department of Energy (DOE) announced funding of nearly $200 million for five to 12 biorefinery project grants.[35]

The DOE is also offering tax credits and deductions for hybrids, diesels, alternative fuel vehicles (AFVs), and electric cars.

Map 3: Major Department of Energy Biofuels Project Locations as of October 1, 2008



http://www.ethanolrfa.org/resource/cellulosic/documents/DOE_ProjMap_100208_with_feedstocks.pdf

The DOE is partnering with various public and private organizations to research and develop alternative energy sources, including 13 biorefineries (nine small-scale and four commercial-scale). For most up-to-date information regarding DOE biofuel projects, visit www.ethanolrfa.org.

The current challenge for the U.S. government is to create policies that encourage both supply and demand of biofuels. As one article opined, "Necessity is the mother of invention. But developing a major new industry based around cellulosic feedstocks able to operate on a semi-commercial basis in such a short period presents a huge technical and scientific challenge."[37]

Biofuels & Jobs

Domestic ethanol production creates jobs, with many of them in rural communities. A 2008 study by global consulting firm LECG, found that the processing of grains into ethanol created 46,000 American jobs. Additionally, production and construction for increased capacity of ethanol resulted in economic activity that created more than 238,500 jobs in all sectors of the economy.[38]

Many states have been significantly impacted by the biofuel industry. In 2007, Iowa's biofuel industry created more than 96,000 construction, processing, refining, administration, and transportation jobs.[39] In the same year, Missouri's ethanol and diesel industries report claimed a yearly average of 6,600 new jobs created.[40]

Illinois has also taken incredible steps. In 2006, the governor revealed a plan under which 50% of Illinois' motor fuels will be derived from local crops and coal by 2017. Every gas station in Illinois will offer 85% ethanol fuel (E85), requiring the tripling of ethanol production. If successful, not only will the plan make Illinois the first state to achieve such a level of energy independence, it will create 30,000 new downstate jobs.[41]

The Midwest

According to the DOE, most states have a blend of laws regulations and incentives relating to "alternative fuels and vehicles, air quality, fuel efficiency, and other transportation-related topics."[42]

Several other Midwest states have taken their cues from the federal government and developed their own policies and incentives - see Table 1. In 2006, Michigan established its own Renewable Fuels Commission. Indiana was one of the first states to transition its ethanol production tax incentives from corn-based to cellulosic-based production.[43] And in 2007, Minnesota's legislature passed "the most aggressive energy package in state history," requiring 25% of Minnesota's energy to be derived from renewable resources by 2025 and an 80% reduction in greenhouse emissions by 2050.[44]

Capitalizing on federal and state regulations, policies, and initiatives, several Midwestern states have developed biofuels operations.[46] Overall, the Midwest is home to the vast majority of US ethanol plants (see the Density of U.S. Corn Harvests and Ethanol Refineries map under Corn Ethanol) and several biodiesel plants (visit www.biodiesel.org).

Table 1: DOE Regulations and Incentives

	State Laws & Regulations	State Initiatives
Illinois	7	20
Indiana	11	14
Iowa	9	13
Kansas	6	8
Michigan	8	7
Minnesota	3	16
Missouri	5	10
Nebraska	3	6
North Dakota	5	8
Ohio	7	3
South Dakota	3	13
Wisconsin	5	15

Data collected from http://www.afdc.energy.gov/afdc/incentives_laws.html

Table 2: Biofuel plants in the Midwest

	Biodiesel Plants Operating	Ethanol Plants Operating	Ethanol Plants Under Construction
Illinois	6	11	4
Indiana*	5	11	2
Iowa	14	29	10
Kansas	2	13	3
Michigan	4	4	0
Minnesota	3	20	1
Missouri	8	6	0
Nebraska	3	18	1
North Dakota	1	4	0
Ohio	6	4	1
South Dakota	1	13	0
Wisconsin	3	9	0

Data collected from http://www.ethanolrfa.org/industry/locations/
* http://www.in.gov/isda/biofuels/factsheet-biofuels-121808.pdf

Some states have developed unique approaches. Iowa's Department of Agriculture and Land Stewardship gives out the Secretary's Biodiesel and Ethanol Marketing Awards to those residents who excel at promoting and marketing biofuels.[48] In 2005, Indiana changed the name of Reynolds, a town, to BioTown, declaring its goal of creating ". . . a model community that is energy self-sufficient."[49] In Kansas, the Department of Commerce supports the Kansas Fuel Retailers Ethanol Guide, a publication connecting consumers with ethanol fuel retailers.

Conclusion

With the fluctuation of oil prices, Illinois' challenge is to continue creating both supply and demand markets for biofuels. While the federal government has implemented several supply initiatives, more can be done to increase demand such as increasing subsidies of biofuels, increasing taxes on petroleum, and working closer with the automotive industry to increase flex fuel vehicle production.

Currently, the United States is not producing significant quantities of any second-generation type of non-corn ethanol, and it is set to be one of the biggest industries in the United States within the next 10 years.[50] Illinois has the opportunity to be a leader in this movement towards sustainability.

Among Midwestern states, Illinois ranks first for alternative energy initiatives and among those with the highest number of laws and regulations.[51] Illinois can utilize its abundance of farming byproducts such as corn stalks and soybean remnants as well as native grasses and vegetables to create cellulosic ethanol. It can also utilize its supplies of sunflowers and soybeans to create biodiesel.

Geographically, Illinois can utilize its more rural areas – some of them with abandoned manufacturing plants – as plant locations. Its central location, the meeting place for several railway lines connecting Eastern US with the West,[52] is ideal for distributing biofuels inputs and finished products.

By recognizing all of these as competitive advantages, Illinois has the opportunity to create a sustainable system of fuel production and consumption while strengthening a new industry that will employ residents for years to come.

Endnotes:

[1]http://pubs.acs.org/cen/news/86/i19/8619notw5.html
[2]http://www.ethanolrfa.org/industry/statistics/#E
[3]http://www.ethanolrfa.org/industry/locations/
[4]Bieneman, Dave. A Clean Energy Strategy Could Bring New Life to the Illinois Economy. October-December 2008.
[5]The US Feed Grains and Livestock Belt includes Illinois, Iowa and the states touching their borders. http://www.encyclopedia.com
[6]http://www.coopamerica.org/pubs/caq/articles/Summer2007cornethanol.cfm
[7]Bieneman, Dave. A Clean Energy Strategy Could Bring New Life to the Illinois Economy. October-December 2008.
[8]http://www.nytimes.com/2007/07/18/washington/18brfs-dead.html?scp=1&sq=corn%20Gulf%20of%20Mexico&st=cse
[9]http://www.coopamerica.org/pubs/caq/articles/Summer2007cornethanol.cfm
[10]http://www.popularmechanics.com/science/earth/2690341.html?page=2
[11]http://www.coopamerica.org/pubs/caq/articles/Summer2007cornethanol.cfm
[12]http://news.bbc.co.uk/2/hi/business/6266277.stm
[13]http://www.coopamerica.org/pubs/caq/articles/Summer2007cornethanol.cfm
[14]http://www.sugarcaneethanolfacts.com/word-on-the-street.html
[15]http://cei.org/gencon/025,05774.cfm
[16]http://money.cnn.com/2007/08/06/news/economy/sugarcane_ethanol/index.htm
[17]http://www.coopamerica.org/pubs/caq/articles/Summer2007cornethanol.cfm
[18]http://www.reuters.com/article/reutersComService4/idUS-TRE5053LN20090106
[19]http://www.nytimes.com/2008/01/14/business/14gm.html?_r=2&oref=slogin
[20]http://news.illinois.edu/NEWS/08/0730miscanthus.html
[21]http://www.rurdev.usda.gov/rbs/pub/sep06/ethanol.htm
[22]http://www.ers.usda.gov/AmberWaves/February05/Findings/Sugarbeets.htm
[23]http://www.rurdev.usda.gov/rbs/pub/sep06/ethanol.htm
[24]http://www.pnas.org/content/105/2/464
[25]http://www.biodiesel.org/resources/faqs/
[26]http://www.biodiesel.org/pdf_files/fuelfactsheets/CommonlyAsked.PDF
[27]http://www.usnews.com/articles/business/your-money/2008/01/11/the-pros-and-cons-of-8-green-fuels.html
[28]http://www.enn.com/press_releases/2786?title=us_biofuels_industry_expected_to_consolidate
[29]http://news.bbc.co.uk/2/hi/science/nature/7817849.stm
[30]http://www.card.iastate.edu/iowa_ag_review/spring_07/article4.aspx
[31]http://www.card.iastate.edu/iowa_ag_review/spring_07/article4.aspx
[32]http://www.card.iastate.edu/iowa_ag_review/spring_07/article4.aspx
[33]http://www.reuters.com/article/reutersComService4/idUS-TRE5053LN20090106
[34]http://www.sugarcaneethanolfacts.com/tariff.html
[35]http://www.beaumontenterprise.com/news/local/government_grants_might_speed_local_interest_in_biofuels_01-04-2009.html
[37]http://www.reuters.com/article/reutersComService4/idUS-TRE5053LN20090106
[38]http://www.ethanolrfa.org/objects/documents/1537/2007_ethanol_economic_contribution.pdf
[39]http://www.iowarfa.org/documents/378,10,Total Economic Impact of the Biofuels Industry for Iowa: 2007
[40]http://www.missourieconomy.org/pdfs/farming_fuel_brochure.pdf, pg 2.
[41]http://www.agr.state.il.us/newsrels/r0821061.html
[42]http://www.afdc.energy.gov/afdc/incentives_laws.html
[43]http://www.in.gov/isda/2401.htm
[44]http://www.mda.state.mn.us/news/publications/renewable/nextgen/nextgenfinalreport.pdf, pg 2.
[45]"Midwestern states" is defined as Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin.
[46]Except where indicated, all figures collected from http://www.ethanolrfa.org/industry/locations/. Last updated January 8, 2009.
[47]http://www.in.gov/isda/biofuels/factsheet-biofuels-121808.pdf
[48]http://www.iowaagriculture.gov/press/2009Press/press011309.asp
[49]http://www.in.gov/biotownusa/
[50]http://www.reuters.com/article/reutersComService4/idUS-TRE5053LN20090106
[51]all of which can be found at http://www.afdc.energy.gov/afdc/progs/state_summary.php/IL
[52]A US railway map can be viewed at http://www.deskmap.com/images/rr_cont2007.gif.