LMC International

The Economic Importance of the Sugar Industry to the U.S. Economy – Jobs & Revenues

Report for:

American Sugar Alliance
Washington, D.C.
USA

August 2011

Research and analysis to inform your business decisions

LMC International

Oxford
14-16 George Street
Oxford OX1 2AF
UK

T +44 1865 791737
F +44 1865 791739
info@lmc.co.uk
www.lmc.co.uk

New York
1841 Broadway
New York, NY 10023
USA

T +1 (212) 586-2427
F +1 (212) 397-4756
info@lmc-ny.com

Kuala Lumpur
B-03-19, Empire Soho
Empire Subang
Jalan SS16/1, SS16
47500 Subang Jaya
Selangor Darul Ehsan
Malaysia
T +603 5611 9337

info@lmc-kl.com

ssa008ny

© LMC International Ltd, 2011. All rights are reserved in all countries. No material may be reproduced or transmitted, in whole or in part, in any manner, without written consent.

While LMC International endeavored to ensure the accuracy of the data, estimates and forecasts contained in this study, any decisions based on them (including those involving investment and planning) are at the client's own risk. LMC International can accept no liability regarding information, analysis and forecasts contained in the study.

Table of Contents

Contents

© LMC International, 2011

List of Tables

© LMC International, 2011

List of Diagrams

© LMC International, 2011

Executive Summary

Introduction and Report Structure

This study is a thorough review and update of the studies LMC International completed in 1989, 1994 and 2001 for the American Sugar Alliance, identifying the economic contributions of the US sugar industry to the US economy. It endeavors to provide an *independent* estimate of the impact of the US sugar sector upon the entire US economy, and includes information on the revenues generated, the numbers of people employed and wages paid by each sector of the industry – beet and cane sugar– and in each phase of the production process – field, factory and for cane sugar, refining. Like all industries, the US sugar sector has a broader impact on the overall economy. To capture this broader impact, economic multipliers, sourced from the US Department of Commerce (DoC), have been used. The DoC distinguishes between indirect impacts and the impacts associated with purchases made by employees in the sector, called induced impacts.

While this executive summary provides an overview of the key findings of our study, the body of the main report is divided into four sections and one annex.

- In Section 1 – Introduction and Methodology, we begin by providing an in-depth comparison between the results of this study and our 1993/94 study and discuss how changes in the industry have altered its economic impact, as well as its impact on jobs and wages paid. Section 1 concludes with a description of the methodology we employed.

- In Sections 2-4, we provide a comprehensive look at the beet sugar, raw cane sugar and refining sectors, respectively. For the sections on beet and cane sugar, results are broken out between the field and factory phases of production. For all three sections we present data with as much state-level detail as possible, although in some cases, we must aggregate results to ensure company confidentiality.

- Finally, in Annex I, we present our results as maps. Here, presenting our findings as ranges allows us to share state-level detail.

Results

In table E1 we present our estimates of the economic impact from the sugar sector to the US economy for crop year 2009/10.

- The direct impact totals $8.4 billion, including $4.6 billion from the beet sugar sector, $2.3 billion from the raw cane sugar industry and nearly $1.5 billion from the refining sector.

Table E1: Economic impact of the sugar industry on the US economy (million dollars)

	Direct	Indirect	Induced	Total
Sugarbeet Field	1,385.1	875.9	438.6	2,699.6
Sugarbeet Factory	3,226.3	3,454.1	1,173.1	7,853.5
Total Beet Sugar	**4,611.5**	**4,329.9**	**1,611.7**	**10,553.1**
Sugarcane Field	986.3	678.7	370.4	2,035.4
Sugarcane Factory	1,344.6	1,486.7	533.8	3,365.1
Total Raw Cane Sugar	**2,330.9**	**2,165.4**	**904.2**	**5,400.5**
Cane Refining	1,462.0	1,474.0	583.9	3,519.9
Total Cane Sugar	**3,792.9**	**3,639.4**	**1,488.1**	**8,920.4**
Total Sugar	**8,404.4**	**7,969.3**	**3,099.9**	**19,473.6**

© LMC International, 2011

- When the economy-wide impact is taken into account through the use of economic multipliers, **we observe that the total economic impact on the US economy exceeds $19 billion dollars**.

In table E2 we delineate our estimates of the employment impact from the US sugar industry for crop year 2009/10.

- In total, the direct employment impact from the US sugar sector is just under 40,000 jobs, which includes 30,000 jobs from the beet sector, nearly 7,000 jobs associated with raw cane sugar production and just under 3,000 jobs linked to cane sugar refining.

- When the economy-wide impact is taken into account through the use of economic multipliers, we observe that the **total impact on employment to the US economy is equivalent to roughly 142,000 jobs**.

Table E2: Employment impact of the sugar industry on the US economy

	Direct	Indirect	Induced	Total
Sugarbeet Field	24,223	30,574	17,999	72,796
Sugarbeet Factory	5,809	13,459	7,447	26,715
Total Beet Sugar	**30,032**	**44,033**	**25,446**	**99,511**
Sugarcane Field	4,170	4,172	2,559	10,902
Sugarcane Factory	2,763	8,373	5,025	16,161
Total Raw Cane Sugar	**6,934**	**12,545**	**7,585**	**27,063**
Cane Refining	2,992	7,693	5,197	15,883
Total Cane Sugar	**9,926**	**20,238**	**12,782**	**42,947**
Total Sugar	**39,958**	**64,272**	**38,228**	**142,457**

In table E3 we display our estimates of wages and benefits associated with the US sugar industry for crop year 2009/10.

Wages and benefits directly associated with the US sugar industry add up to nearly $1.2 billion. When economy-wide impacts are taken into account, **the impact on wages and benefits approaches nearly $4.2 billion**.

Table E3: Impact on wages from the sugar industry on the US economy (million dollars)

	Direct	Indirect	Induced	Total
Sugarbeet Field	249.5	275.2	156.5	681.2
Sugarbeet Factory	418.8	863.4	374.2	1,656.4
Total Beet Sugar	**668.3**	**1,138.6**	**530.8**	**2,337.7**
Sugarcane Field	96.8	118.3	74.2	289.3
Sugarcane Factory	150.7	298.1	141.8	590.7
Total Raw Cane Sugar	**247.4**	**416.5**	**216.1**	**880.0**
Cane Refining	256.3	457.1	247.4	960.8
Total Cane Sugar	**503.8**	**873.6**	**463.4**	**1,840.8**
Total Sugar	**1,172.1**	**2,012.2**	**994.2**	**4,178.4**

© LMC International, 2011

Comparison with Previous Studies

In table E4 we provide a cursory comparison of the results of this study with the results of our study from 1993/94. A more thorough comparison of the 93/94 and 09/10 study is presented in Section 1.

- Between 1993/94 and 2009/10, the direct economic impact of the US sugar industry on the US economy increased by more than 80%, from $10.7 to $19.5 billion when indirect and induced impacts are included – a reflection of slightly greater domestic production and a sharp increase in commodity prices worldwide.
- During this same time frame, the industry has faced stagnant sugar prices (until recently), while the cost of inputs has risen. To stay competitive, the industry has increased yields and expanded farm size on the field side and increased efficiency while losing higher-cost producers on the factory side. The inevitable result of this consolidation and efficiency gains has been a drop in the area planted to beets and sharp losses in the number of facilities devoted to producing sugar domestically (diagrams E1 and E2).

Diagram E1: Contraction in area planted to sugar crops

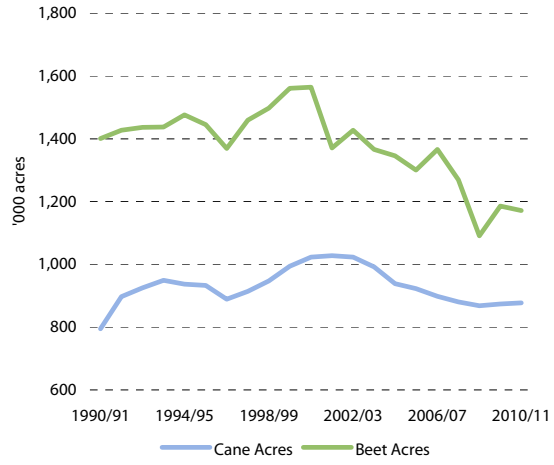
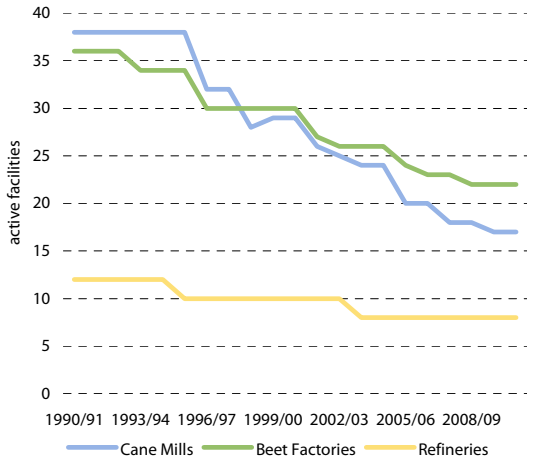


Diagram E2: Consolidation in sugar processing facilities



- As the US sugar industry has endeavored to become more efficient, the number of individuals employed by the sector has fallen. The biggest loss in employees was in sugarcane field production, because the industry in the early 90s still employed tens of thousands of individuals to cut cane manually. This, coupled with the fallout from factory closures and increased farm size, has served to decrease the total employment impact of the industry by nearly 40%, from 252,000 in 1993/94 to over 142,000 in 2009/10.
- While the decline in the number of people employed by the industry has been significant, jobs that have remained have tended to be higher-skilled and better-paying. When expressed on a per-capita basis, the average wage paid in the sugar sector has risen by 60% from 1993/94 to 2009/10, that is, to roughly $30,000 per year today, a growth rate well above what would be expected under normal wage inflation.
- Lastly, the amount of domestic sugar produced per individual directly employed by the sugar sector has increased starkly in recent years, increasing by 80% since our 1993/94 study from 119 tons to 216 tons of sugar per employee, excluding jobs in the refining sector.

© LMC International, 2011

Table E4: 2009/10 versus 1993/94 results

	1993/94	2009/10	% Change
Jobs (full time equivalent)			
Direct Employment	68,264	39,958	-41%
Direct, Indirect and Induced Employment	251,587	142,457	
Value added (million dollars)			
Direct	4,621	8,404	82%
Direct, Indirect and Induced	10,706	19,474	
Wages paid (million dollars)			
Direct	1,364	1,172	-14%
Direct, Indirect and Induced	4,862	4,178	
Productivity			
Sugar production (million tons)	7.65	7.97	4%
Tons of domestic sugar per employee (excludes refining jobs)	119	216	80%

1. Indirect and induced impacts adjusted for DoC multipliers

Section 1 – Introduction and Methodology

Introduction

This study is a thorough review and update of the studies that LMC International completed in 1989, 1994 and 2001 for the American Sugar Alliance, identifying the economic contributions of the US sugar industry to the US economy. The study endeavors to provide an *independent* estimate of the impact of the US sugar sector upon the entire US economy, and includes information on the revenues generated, the numbers of people employed, and the wages paid by each sector of the industry – beet and cane sugar– and in each phase of the production process – field, factory and for cane sugar, refining. Like all industries, the US sugar sector has a broader impact on the overall economy. To capture this broader impact, economic multipliers, sourced from the US Department of Commerce (DoC). The DoC distinguishes between indirect impacts and the impacts associated with purchases made by employees in the sector, to which they refer as induced impacts.

Overview of Results and Comparison to Previous Studies

Since LMC began covering the economic impact of the US sugar sector in the late 1980s, the industry has gone through a number of important shifts in the face of stagnant domestic sugar prices, and rising prices for inputs in order to stay competitive. In table 1.1 we compare the results of this study about the impact of the US sugar industry on the economy, employment and wages paid for 2009/10 with our results for 1993/94. We have included a number of additional key industry characteristics highlighting the most important shifts through the years.

Diagram 1.1: Contraction in area planted to sugar crops

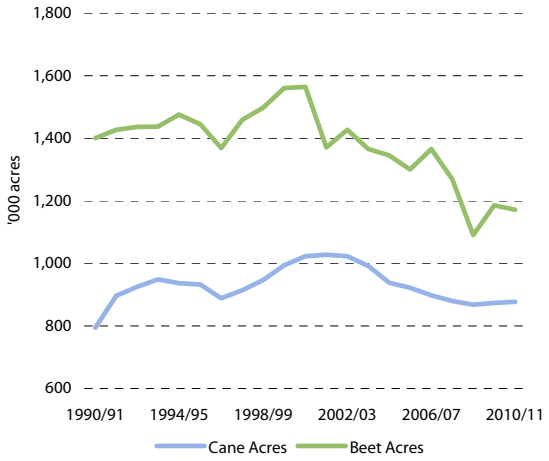
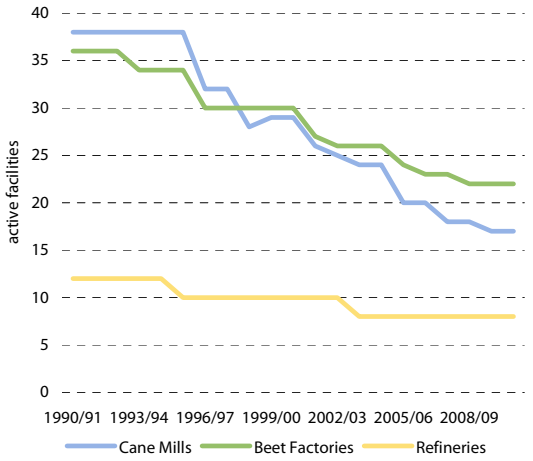


Diagram 1.2: Consolidation in sugar processing facilities



- Over the last 15 years, the area planted to sugar crops has dropped significantly, falling 17.5% for beets and nearly 8% for cane (diagram 1.1). This contraction is a reflection of higher priced areas, namely, in Hawaii and California falling out of cane sugar and beet sugar production, respectively, but also a reflection of farmers doing more with existing acreage. During this observed time frame, sugarbeet production was up nearly 15% and cane production was down by just 3%, thanks to yield increases of 39% and 5%, respectively.

- Phenomenal yield increases for beets were the results of years of collaboration between beet growers and seed companies to improve beet genetics. On the cane front, yield

© LMC International, 2011

improvements were made across the board however the loss of acreage in high-yielding Hawaii moderates these yield gains at the national level.

- As delineated in rows "f" through "k" in table 1.1, contraction in the industry was not confined to just the field sector. The number of beet factories in the country has declined by more than one- third, while the number of cane mills has fallen by more than half. Contraction in both the cane and beet sectors was spurred by flat sugar prices. On the beet front, this was felt most acutely in California, where rising prices for competing crops led growers to abandon the beet and its relatively lower margins. On the cane front, contraction of the industry was most evident in Hawaii, where the pain of flat sugar prices was even greater due to its isolated location and the rapidly growing costs for fuel and labor. The closure of US sugarcane mills, beet factories and refineries is illustrated in diagram 1.2.

- *While many mills and factories closed during this observed timeframe, those mills and factories that survived did so by improving their competitive position and increasing efficiency.* Since 1993/94, the average processing capacity of beet factories in the US has increased by nearly 18%, while the average capacity of sugarcane mills has increased by 77%.

- Inevitably, the fallout from the industry-wide consolidation and impetus to cut costs has been a loss of jobs directly attributable to the sugar industry.

    - Compared with 1993/94, the employment impact in the field and factory stages of beet sugar production is 15% less, due to factory closures, increased farm size and a reduced need for field labor stemming from the adoption of Roundup Ready sugarbeets.

    - The raw cane sector has seen the biggest decline in employment impact since the mid-90s. During this time span, the number of workers employed in the production of raw cane sugar has decreased by 76%. While this decrease is large, it is not unexpected given that in 1993/94 much of the cane harvest across the country was still done manually and that the number of plantations in labor-intensive Hawaii was seven compared to just one today.

    - Finally, in the refining sector, which lost one-third of its active facilities in the observed time frame, the employment impact has fallen by an estimated 29%.

    - In total, the employment impact of the US sugar industry today is over 142,000 jobs, a 43% decline from 1993/94.

- Despite the contraction in the area planted to sugar crops and the closure of 33 beet factories and cane mills, the US sugar industry of 2009/10 managed to produce 4.2% more domestic sugar than the industry of 1993/94 (row ac). Given this increase and the decrease in the number of workers, 216 tons of domestic sugar is produced per individual directly employed by the sector per year in the US, an 81% increase over that of 1993/94 (row al).

- Lastly, in 1993/94, the total economic impact of the sugar industry on the US economy was $10.6 billion. For 2009/10 , the total economic impact of the sugar industry on the US economy increased by 82% to an estimated $19.5 billion (row x), a reflection of sharply higher commodity prices worldwide.

© LMC International, 2011

Table 1.1: The economic impact of the US sugar industry in 2009/10 vs. 1993/94

			1993/94	2009/10	% Change
a	Area Planted to Beets	000 acres	1,437.7	1,185.8	-17.5%
b	Area Planted to Cane	000 acres	948.3	873.9	-7.8%
c	Beet Yield	tons per acre	18.6	25.9	39.2%
d	Cane Yield	tons per acre	33.2	34.9	5.2%
e					
f	Beet Factories		34	22	-35.3%
g	*Average daily milling capacity*	*tcd*	*5,907*	*6,958*	*17.8%*
h	Cane Mills		38	17	-55.3%
i	*Average daily milling capacity*	*tbd*	*9,126*	*16,129*	*76.7%*
j	Active Refineries		12	8	-33.3%
k	*Average daily refining capacity*	*daily melt*	*2,108*	*2,365*	*12.2%*
l					
m	**Employment impact of entire US sugar industry 1/**	**persons**	**251,587**	**142,457**	**-43.4%**
o	Employment impact of beet sugar production 2/	persons	116,892	99,511	-14.9%
p	Employment impact of raw cane sugar production	persons	112,238	27,063	-75.9%
q	Employment impact of cane sugar refining	persons	22,457	15,883	-29.3%
r					
s	**Wages impact from all of US sugar industry 1/**	**Million Dollars**	**4,862**	**4,178**	**-14.1%**
t	Wage impact of beet sugar production	*Million Dollars*	1,935	2,338	20.8%
u	Wage impact of raw cane sugar production	*Million Dollars*	2,076	880	-57.6%
v	Wage impact of cane sugar refining and marketing	*Million Dollars*	852	961	12.8%
w					
x	**Total Economic Impact 1/**	**Million Dollars**	**10,706**	**19,474**	**81.9%**
y	Beet sugar production economic impact	Million Dollars	5,321	10,553	98.3%
z	Raw cane sugar production economic impact	Million Dollars	3,661	5,401	47.5%
aa	Raw cane sugar refining economic impact	Million Dollars	1,724	3,520	104.2%
ab					
ac	**Total Domestic Sugar Production**	**Million Tons**	**7.65**	**7.97**	**4.2%**
ad	Domestic Beet Sugar Production	Million Tons	4.09	4.57	11.7%
ae	Domestic Raw Cane Sugar	Million Tons	3.56	3.4	-4.5%
af					
ag	**Jobs directly linked to US sugar industry**	**persons**	**68,264**	**39,958**	**-41.5%**
ah	Jobs in beet sugar production 2/	persons	35,277	30,032	-14.9%
ai	Jobs in raw cane sugar production	persons	28,756	6,934	-75.9%
aj	Jobs in cane sugar refining	persons	4,231	2,992	-29.3%
ak					
al	**Tons of domestic sugar produced per employee (excluding refinery employees)**	**tons**	**119**	**216**	**80.5%**

1. Indirect and induced impacts have been adjusted for DoC multipliers
2. For full-time field employees in the beet sector, the percentage of hours devoted to other crops is not reflected in this number. For more detail see table 2.2 in section 2.

Methodology

Below we provide an overview of the scope of this study, as well as the methodology employed to arrive at our results.

Sources of data

For this LMC study on the impact of the US sugar industry on the US economy, we were fortunate to have complete cooperation from *every company and grower group* belonging to the American Sugar

Alliance, which represents almost all of America's sugar producers. Separate questionnaires were developed for 1) raw cane sugar mills, 2) beet sugar cooperatives, 3) integrated cane sugar mills, 4) annexed cane sugar refineries and 5) autonomous cane sugar refineries. Within these questionnaires, detailed responses gave us precise figures on sugar and by-product production, employment and wages and benefits paid. We did not ask for sales price data due to its sensitive nature, and instead relied on transparent data sources for prices, primarily USDA-ERS.

While detailed responses from industry participants have helped to make this study more robust, we supplemented these in various ways to ensure a complete picture.

- For field-side employment associated with sugarcane production, we consulted specialists within the university extension system.
- While most cooperatives were able to give us detailed information on the production practices of their growers, smaller factories in a few cases were unable to do so. In these cases we communicated directly with growers within the factory district.
- For the refining sector, we supplemented questionnaire responses with internal LMC data and the results of previous studies on this subject.

To the extent possible, results in this study are presented on a state-by-state basis. *Please note:* For some states, particularly within the refining sector, results have been aggregated to preserve company confidentiality.

Scope of study

This study covers the economic impact of the US sugar industry on the overall economy. Unlike previous studies done on this subject, the economic impact of the corn sweetener industry has not been included. In gauging the impact of the sugar industry we look at three metrics:

- The *economic* impact of the industry
- The impact of the industry on *employment*
- The impact of the industry on *wages* paid.

To estimate the economic impact of the industry (bullet 1), we look just at those operations where value is added, including:

- at the field level for the production of sugarcane and sugarbeets,
- at the mill and factory level for the production of raw cane sugar and beet sugar, and
- at the refinery, where raw cane sugar is refined to white.

Note: Our calculations for value added stop at the factory/refinery gate as granulated white sugar and do not include further downstream processing or value added associated with delivery.

To estimate the impact of the industry on employment and wages, we expand our scope slightly to capture those individuals working in administration, support or marketing, given that many of these functions are distinct from production, especially among larger producers.

© LMC International, 2011

Estimating indirect and induced impacts

Data provided to us by industry participants, USDA ERS and our own estimates were used to calculate the *direct* impact of the sugar industry on the US economy. However, this calculation fails to capture the ripple effect of the sugar industry on the US economy as a whole. To capture the inevitable interplay between various subsectors of the economy, economists have employed a tool known as economic multipliers.

In previous studies, we have employed 2.5 as an estimated economic multiplier based on general figures provided by USDA (ERS Agricultural Trade Update, February 2000). However, in recent years, more detailed data has been made available by the US Department of Commerce (DoC), which provides state-specific multipliers for 1) economic output, 2) earnings and 3) employment specific to beet and cane sugar processing as well as general field multipliers for agricultural output.

The DoC classifies these multipliers into "Type I" and "Type II."

- Type I multipliers capture the indirect impact of output, earnings and employment.
- Type II multipliers capture the indirect impact as well as so-called "induced" impacts, which are associated with purchases made by employees in the sector.

In this study, we distinguish between the indirect and induced components in the results.

Field and processing multipliers for beet and cane sugar production, as provided by the DoC, are given in tables 1.3 – 1.12 below while the national weighted average of these multipliers is provided in table 1.2.

Table 1.2: Weighted national average of Department of Commerce cane and beet sugar industry multipliers

	Total Indirect and Induced			Indirect			Induced		
	Value Added	Wage	Employment	Value Added	Wage	Employment	Value Added	Wage	Employment
Beet Factory	2.4	4.0	4.6	2.1	3.1	3.3	1.4	1.9	2.3
Beet Field	1.9	2.7	3.0	1.6	2.1	2.3	1.3	1.6	1.7
Cane Factory	2.5	3.9	5.8	2.1	3.0	4.0	1.4	1.9	2.8
Cane Field	2.1	3.0	2.6	1.7	2.2	2.0	1.4	1.8	1.6

© LMC International, 2011

Table 1.3: Type I beet field multipliers

	Output	Earnings	Employment
California	1.73	2.39	2.49
Colorado	1.71	2.27	1.71
Idaho	1.57	2.07	2.58
Illinois	1.76	2.30	2.70
Iowa	1.62	2.11	2.81
Michigan	1.57	2.02	1.62
Minnesota	1.67	2.15	2.66
Montana	1.71	2.24	1.73
Nebraska	1.58	2.01	2.76
North Dakota	1.61	2.02	2.63
Ohio	1.66	2.12	1.47
Oregon	1.68	2.26	1.72
Utah	1.70	2.21	1.57
Washington	1.74	2.35	2.37
Wyoming	1.54	1.96	1.86

Source: US DoC RIMS II

Table 1.4: Type II beet field multipliers

	Output	Earnings	Employment
California	2.20	3.33	3.48
Colorado	2.15	3.17	2.20
Idaho	1.83	2.57	3.38
Illinois	2.22	3.22	4.05
Iowa	1.88	2.59	3.61
Michigan	1.93	2.75	2.09
Minnesota	2.05	2.89	3.80
Montana	2.00	2.84	2.11
Nebraska	1.81	2.44	3.59
North Dakota	1.83	2.44	3.44
Ohio	2.07	2.93	1.81
Oregon	2.04	2.99	2.12
Utah	2.11	3.05	1.94
Washington	2.15	3.17	3.18
Wyoming	1.72	2.35	2.24

Source: US DoC RIMS II

Table 1.5: Type I beet factory multipliers

	Output	Earnings	Employment
California	2.21	3.34	3.35
Colorado	2.18	3.30	4.76
Idaho	1.99	2.81	3.18
Illinois	1.00	0.00	0.00
Iowa	1.00	0.00	0.00
Michigan	2.00	2.97	3.13
Minnesota	2.23	3.35	3.56
Montana	2.03	2.79	3.38
Nebraska	2.07	3.13	3.09
North Dakota	1.99	2.96	3.20
Ohio	1.76	2.65	2.93
Oregon	2.24	3.49	4.47
Utah	1.00	0.00	0.00
Washington	1.00	0.00	0.00
Wyoming	1.93	2.56	2.52

Source: US DoC RIMS II

Table 1.6: Type II beet factory multipliers

	Output	Earnings	Employment
California	2.76	4.66	4.86
Colorado	2.72	4.60	6.81
Idaho	2.28	3.50	4.28
Illinois	1.00	0.00	0.00
Iowa	1.00	0.00	0.00
Michigan	2.44	4.04	4.43
Minnesota	2.71	4.50	5.30
Montana	2.34	3.53	4.34
Nebraska	2.34	3.81	4.06
North Dakota	2.23	3.57	4.24
Ohio	2.18	3.65	4.32
Oregon	2.69	4.61	5.97
Utah	1.00	0.00	0.00
Washington	1.00	0.00	0.00
Wyoming	2.15	3.06	3.11

Source: US DoC RIMS II

Table 1.7: Type I cane field multipliers

	Output	Earnings	Employment
Florida	1.64	2.26	2.34
Hawaii	1.55	1.98	1.67
Louisiana	1.74	2.27	1.87
Texas	1.86	2.50	2.11

Source: US DoC RIMS II

Table 1.8: Type II cane field multipliers

	Output	Earnings	Employment
Florida	2.04	3.08	3.15
Hawaii	1.86	2.61	2.05
Louisiana	2.08	2.98	2.38
Texas	2.37	3.53	2.94

Source: US DoC RIMS II

© LMC International, 2011

Table 1.9: Type I cane factory multipliers

	Output	Earnings	Employment
Florida	2.04	2.90	4.33
Hawaii	1.95	2.64	2.98
Louisiana	2.18	3.08	3.74
Texas	2.28	3.34	5.55

Source: US DoC RIMS II

Table 1.10: Type II cane factory multipliers

	Output	Earnings	Employment
Florida	2.47	3.95	6.59
Hawaii	1.95	2.64	2.98
Louisiana	2.57	4.05	5.27
Texas	2.86	4.72	8.92

Source: US DoC RIMS II

Table 1.11: Type I cane refining/marketing multiplier

	Output	Earnings	Employment
California	2.12	3.08	4.08
Florida	2.04	2.90	4.33
Georgia	2.22	3.28	3.87
Hawaii	1.95	2.64	2.98
Illinois	1.50	2.20	2.32
Louisiana	2.18	3.08	3.74
Kentucky	1.00	0.00	0.00
Maryland	1.68	2.33	3.21
New Jersey	1.00	0.00	0.00
New York	1.60	2.13	2.62
Ohio	1.60	2.29	1.97
Tennessee	1.50	2.11	2.33
Texas	2.28	3.34	5.55

Source: US DoC RIMS I

Table 1.12: Type II cane refining / marketing multiplier

	Output	Earnings	Employment
California	2.63	4.30	6.30
Florida	2.47	3.95	6.59
Georgia	2.74	4.54	5.87
Hawaii	1.95	2.64	2.98
Illinois	1.87	3.08	3.67
Louisiana	2.57	4.05	5.27
Kentucky	1.00	0.00	0.00
Maryland	1.97	3.08	4.84
New Jersey	1.00	0.00	0.00
New York	1.86	2.72	3.71
Ohio	1.96	3.16	2.79
Tennessee	1.83	2.91	3.56
Texas	2.86	4.72	8.92

Source: US DoC RIMS

© LMC International, 2011

Section 2 – The Sugarbeet Industry

In this section we address the impact to the economy and employment by the US sugarbeet industry, including sugarbeet production as well as beet sugar production and marketing.

Beet Cultivation

Beet cultivation production and value

In table 2.1, we present state-by-state information on the acreage, production and value of sugarbeets in the US during the 2009/10 crop year.

- For 2009/10, sugarbeets were planted on 1.19 million acres. Roughly 97% of the area planted was harvested or 1.15 million acres. With yields averaging close to 26 tons per acre, this corresponded to 29.8 million tons of sugarbeets produced.
- Roughly half of sugarbeet production takes place in North Dakota and Minnesota in both the Red River Valley and in the southern part of Minnesota. The remainder of production is scattered across the northern tier of the country and the Imperial Valley of California, with regional production hubs in Michigan and Idaho.
- Based on an average price of $46.70 per ton, sugarbeet production in the US generates nearly $1.4 billion of direct economic impact on the US economy manifested through grower revenues.
- In Minnesota, the value of sugarbeet production exceeds half a billion dollars, while it exceeds 200 million dollars in Idaho and North Dakota and 100 million dollars in Michigan.

Since the 1994 study, area planted to sugarbeets has fallen 18.5%, while beet yields have increased by nearly 40% to 26 tons per acre. During this 15-year span, the value of sugarbeet production has increased by 28% from $1.08 billion to $1.39 billion.

Table 2.1: Acreage, production and value added from sugarbeet production, 2009/10

	Area planted ('000 acres)	Area harvested ('000 acres)	Yield (st/acre)	Production ('000 st)	Price (est) (per ton)	Value of beets (millions)
California	25.3	25.2	43.9	1,106.3	$43.6	$48.2
Colorado	35.1	35	27.5	962.5	$46.5	$44.8
Idaho	164	163	34.3	5,590.9	$40.9	$228.4
Michigan	138	136	24.4	3,318.4	$42.8	$142.1
Minnesota	464	449	23.7	10,641.3	$48.6	$516.6
Montana	38.4	33.6	29.8	1,001.3	$49.4	$49.5
Nebraska	53	52.6	24.6	1,294.0	$49.4	$63.9
North Dakota	225	218	22	4,796.0	$49.6	$238.0
Ohio	0	0	na	0.0	na	$0.0
Oregon	10.6	10.5	37.6	394.8	$40.9	$16.1
Washington	1.6	1.6	42	67.2	$40.9	$2.7
Wyoming	32.4	25.6	26.5	678.4	$51.2	$34.7
Total US	**1,187.4**	**1150.1**	**25.9**	**29,851.0**	**$46.7**	**$1,385.1**

Sources: USDA, ERS

© LMC International, 2011

Beet cultivation employment and wages

In table 2.2 we present the employment benefits from the cultivation of sugarbeets in 2009/10 by state, distinguishing between the total amount of full-time and seasonal labor employed, as well as the total value of wages and benefits paid by state.

In this table, part-time employees have been converted to a full-time equivalent basis by dividing the number of hours worked by 2000, which is assumed to be hours worked annually for most full-time employees. Dealing with full-time employees on sugarbeet operations presents its own methodological challenges. All beet farms in the US cultivate other broad acre crops as well and full-time employees invariably devote a share of their hours to these other crops. In our questionnaires we were able to ascertain the share of hours devoted to sugarbeets by full-time farm employees. While this percentage is reported in the second to last column of table 2.2, we have not adjusted our full-time employment number on this basis, thereby following the methodology of previous studies.

From table 2.2, we observe that:

- There are between 5,700-5,800 beet farmers in the US and roughly 2,300 unpaid family members adjusted to a full-time equivalent, actively working at beet farming. Our grower number is a conservative estimate based strictly on contracted growers. It does not account for intra-farm partnerships. Inclusion of this type of arrangement would likely result in a larger calculation of growers.

- It is estimated that there are an additional 1,400 non-active beet cooperative shareholders, who rent their shares to active growers. In most cases, these non-active shareholders are retirees and former beet growers deriving a significant share of their retirement income from the value of these shares.

Table 2.2: Employment and wages from sugarbeet production, 2009/10

	Farmers	Non-active shareholders	Unpaid family members (fte)	Full-time paid labor (whole farm)	Part-time paid beet labor (fte)	Total paid beet labor	Total paid+unpaid beet workers	Share of full time hours devoted to beets	Wages and Benefits Paid (million)
California	70	0	44	572	na	572	686	50%	$7.6
Colorado	280	0	241	1,070	294	1,364	1,885	40%	$23.5
Idaho	512	206	507	1,014	203	1,217	2,442	45%	$19.1
Michigan	1,065	0	799	2,237	736	2,972	4,836	35%	$45.1
Minnesota	1,714	538	41	2,794	295	3,089	5,383	35%	$51.1
Montana	376	0	120	750	253	1,003	1,499	50%	$23.3
Nebraska	450	0	364	1,616	444	2,060	2,874	40%	$35.5
North Dakota	906	611	20	1,355	143	1,498	3,034	35%	$24.8
Ohio	0	0	0	0	0	0	0	na	$0.0
Oregon	74	30	73	146	29	175	352	45%	$2.7
Washington	3	1	3	6	1	7	14	45%	$0.1
Wyoming	264	6	101	633	214	846	1,218	40%	$16.8
Total US	**5,714**	**1,392**	**2,314**	**12,191**	**2,612**	**14,803**	**24,223**	**--**	**$249.5**

Sources: LMC estimates and beet sugar producers

1. Full-time employees on sugarbeet farms invariably spend a good portion of the year on other crops. Our full-time number does not adjust for this percentage

© LMC International, 2011

- In addition to unpaid labor there are around 12,000 full-time employees (a share of whose hours are devoted to other crops) and approximately 2,600 seasonal workers yields a total of just over 24,000 jobs directly linked to sugarbeet production and harvest.

- Total wages and benefits paid, which excludes remuneration received from farmers and their family members, is equal to roughly $250 million.

Beet Processing

Beet processing production and value

We now turn our attention to the processing side of the beet industry. Table 2.3 presents the estimated value added from sugar beet processing, the sum of final products minus the value of the input, namely sugarbeets. In our previous studies, final products included white beet sugar, beet molasses and beet pulp. However, given its expanded market, we have now included values for betaine and the CSB by-product.

The valuation of sugar was done on the basis of the Midwest beet sugar price because of the transparency of that price. No adjustment was made to account for regional variations in the white sugar price because increasingly, these differences are small and vary within the course of a year. Prices for beet pulp and beet molasses was gathered from USDA and the "Feedstuffs" publication, while prices for betaine and CSB were provided by industry sources.

Table 2.3: Value added from beet sugar production, 2009/10

	Value of Final Products	of which sugar (millions)	of which molasses (millions)	of which beet pulp (millions)	of which betaine (millions)	of which CSB (millions)	- Value of sugarbeets (millions)	= Value Added (millions)
California	174.5	155.7	5.6	13.2	0.0	0.0	52	122.4
Colorado	135.5	105.0	4.3	26.3	0.0	0.0	48	87.1
Idaho	976.1	903.4	1.8	53.3	13.1	4.5	248	728.4
Michigan	566.4	518.5	19.7	21.7	4.6	1.9	153	413.0
Minnesota	1276.5	1197.3	10.5	63.5	1.2	4.0	428	848.3
Montana	196.7	177.8	6.6	12.2	0.0	0.0	53	143.3
Nebraska	165.6	131.9	5.9	21.9	3.7	2.3	45	120.3
North Dakota	906.6	829.8	14.1	50.6	8.2	3.9	303	603.3
Ohio	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
Oregon	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
Washington	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
Wyoming	213.6	185.4	5.6	22.6	0.0	0.0	53	160.2
Total US	4,611.5	4,204.8	25.9	285.2	46.7	16.6	1,385.1	3,226.3

Sources: LMC estimates and beet sugar producers
1/ Betaine and Concentrated Separator By-product (CSB) are byproducts of beet molasses desugarization. While both are used in feed formulation the former is considerably more valuable.

From table 2.3, we observe that:

- The value of products produced by the beet sugar industry exceeded $4.6 billion in 2009/10. This is a substantial increase from previous studies and is a reflection of the trend in higher commodity prices in general. Of the total value of production, $4.2 billion comes from sugar, $26 million from beet molasses, $285 million from beet pulp, $47 million dollars from betaine and $17 million from CSB.

© LMC International, 2011

- Subtracting a total value for sugarbeets of $1.38 billion, the total direct value added from beet sugar production is $3.23 billion.

Beet processing and marketing – employment and wages

In table 2.4, we present our estimates for employment and wages paid in the US beet processing sector in 2009/10. As in table 2.2, employment is presented on both a full-time and part-time basis, with part-time employees being adjusted to a full-time equivalency. To preserve confidentiality and to not reveal company specific wage information, the data in table 2.4 is presented on an aggregated basis. States, such as Ohio and Illinois, where no processing faculties exist, are grouped with those states producing the sugar handled by these facilities.

- In total, there are 5,809 jobs directly associated with beet sugar processing and marketing, with total wages and compensation of 419 million dollars. Roughly one-fifth of these jobs are part-time with the remainder being full-time.

- Of the 5,809 jobs, it is estimated that 4,883 jobs are in the factory, 395 jobs are in administration and marketing, while the remaining 531 jobs are in other facilities such as piling stations and warehouses.

© LMC International, 2011

Table 2.4: Employment and wages paid from beet sugar production, 2009/10

	Total Beet Processing and Admin				Factory			Admin and Marketing			Other facilities and Piling Stations		
	Full-time	Part-time	Total	Total Compensation (millions)	Full-time	Part-time	Total Compensation (millions)	Full-time	Part-time	Total Compensation (millions)	Full Time	Part Time	Total Compensation (millions)
Colorado, Montana, Nebraska and Wyoming	797	237	1,034	67	738	187	57	47	0	7	12	49	3
California, Idaho, Illinois, Oregon, Washington and Utah	1,447	390	1,837	107	1,275	339	91	100	0	9	72	50	6
Michigan, Minnesota and North Dakota, Iowa and Ohio	2,349	589	2,938	246	1,978	366	187	220	27	37	151	197	21
Total	**4,593**	**1,216**	**5,809**	**419**	**3,991**	**892**	**336**	**367**	**28**	**52**	**235**	**296**	**31**

Table 2.5: Value added from beet sugar production – direct, indirect and induced impacts (US$)

	Total				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	total
Colorado, Montana, Nebraska and Wyoming	$703.8	$651.9	$213.0	$1,568.7	$192.9	$122.6	$55.2	$370.8	$510.9	$529.3	$157.8	$1,198.0
California, Idaho, Illinois, Oregon, Washington and Utah	$1,146.4	$1,045.5	$369.7	$2,561.6	$295.5	$179.0	$87.4	$562.0	$850.8	$866.6	$282.3	$1,999.7
Michigan, Minnesota and North Dakota, Iowa and Ohio	$2,761.3	$2,632.5	$1,029.0	$6,422.8	$896.7	$574.3	$296.0	$1,766.9	$1,864.6	$2,058.2	$733.0	$4,655.8
Total	**$4,611.5**	**$4,329.9**	**$1,611.7**	**$10,553.1**	**$1,385.1**	**$875.9**	**$438.6**	**$2,699.6**	**$3,226.3**	**$3,454.1**	**$1,173.1**	**$7,853.5**

© LMC International, 2011

Multiplier Effects

As we previously discussed under methodology in Section 1, we use income, employment and wage multipliers provided by the US Department of Commerce to estimate how economic activity, employment and compensation spread through the entire US economy. Tables 2.5-2.6 present the direct effects from the sugar industry on the economy, on employment and wages as well as indirect and induced effects.

- For table 2.5 we see that the direct economic impact for sugarbeet production is just under $1.4 billion, while for beet sugar production it is $3.2 billion. These figures are derived from tables 2.1 and 2.3 and when combined equal an economic impact of beet sugar production of 4.6 billion dollars.
- The indirect economic impact from beet sugar production on the total economy is $4.3 billion, while the induced impact, which is from purchases made by employees, is $1.6 billion.
- This implies that the total economic impact from beet sugar production in the US, with direct and induced effects included, is just under $10.5 billion.
- From table 2.6, we observe that direct employment generated by sugarbeet production is just over 24,000 jobs, while for beet sugar production it is just over 5,800 jobs. These figures are derived from tables 2.2 and 2.4 and when combined equal a total direct employment impact of approximately 30,000 jobs.
- The indirect employment impact from beet sugar production on the total economy is 44,000 jobs, while the induced impact is 25,000 jobs.
- This implies that the total impact on employment from beet sugar production in the US, with direct and induced effects included, is approximately 100,000 jobs.
- Table 2.7 presents the direct, indirect and induced impacts on wages from the beet sugar industry in the US. The direct impact on wages is $250 million on the field side and $419 million on the factory side. These two figures were first presented in tables 2.2 and 2.4.
- When combined with an indirect effect on wages of $1.14 billion and an induced effect of $531 million, the total impact on wages from beet sugar production is calculated to be $2.34 billion dollars.

© LMC International, 2011

Table 2.6: Employment from beet sugar production – direct, indirect and induced impacts

	Total				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	total
Colorado, Montana, Nebraska and Wyoming	8,510	10,972	5,458	24,939	7,476	8,541	4,339	20,356	1,034	2,430	1,120	4,583
California, Idaho, Illinois, Oregon, Washington and Utah	5,331	9,272	4,901	19,503	3,494	5,162	2,781	11,436	1,837	4,110	2,120	8,067
Michigan, Minnesota and North Dakota, Iowa and Ohio	16,191	23,790	15,087	55,068	13,253	16,871	10,880	41,004	2,938	6,919	4,207	14,064
Total	**30,032**	**44,033**	**25,446**	**99,511**	**24,223**	**30,574**	**17,999**	**72,796**	**5,809**	**13,459**	**7,447**	**26,715**

Sources: LMC estimates and USDoC RIMS II database

Table 2.7: Wages paid from beet sugar production – direct, indirect and induced impacts (US$)

	Total				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	total
Colorado, Montana, Nebraska and Wyoming	$165.7	$239.3	$110.2	$515.2	$99.0	$110.7	$56.8	$266.5	$66.6	$128.7	$53.4	$248.7
California, Idaho, Illinois, Oregon, Washington and Utah	$136.1	$235.3	$100.0	$471.5	$29.5	$34.5	$18.9	$82.9	$106.6	$200.8	$81.3	$388.7
Michigan, Minnesota and North Dakota, Iowa and Ohio	$366.5	$664.0	$320.4	$1,350.9	$120.9	$130.0	$80.9	$331.8	$245.6	$534.0	$239.5	$1,019.1
Total	**$668.3**	**$1,138.6**	**$530.7**	**$2,337.6**	**$249.5**	**$275.2**	**$156.5**	**$681.2**	**$418.8**	**$863.4**	**$374.2**	**$1,656.4**

Sources: LMC estimates and USDoC RIMS II database

© LMC International, 2011

Section 3 – The Sugarcane Industry

This chapter focuses on the economic impact of the US sugarcane sector, up to the stage where raw cane sugar is produced, while our discussion on cane sugar refining is saved for section 4. We present the key employment and wage data in a series of tables similar to those presented for sugarbeets in section 2.

Cane Cultivation

Cane cultivation production and value

In table 3.1, we present state-by-state information on the acreage, production and value of sugarcane in the US during the 2009/10 crop year.

- For 2009/10, sugarcane was planted on 812,000 acres. With yields averaging close to 35 tons per acre, this corresponded to just over 28 million tons of cane produced.
- Roughly 90% of sugarcane production took place in Florida and Louisiana with the remainder coming from Texas and Hawaii.
- Based on an average price of $34.8 per ton, sugarcane production in the US generates 986 million dollars of direct economic impact on the US economy manifested through grower revenues.
- In Florida and Louisiana, the value of sugarcane production exceeds $400 million, while for Texas and Hawaii production is valued at around $40 million.

Table 3.1: Acreage, production and value added from sugarcane production, 2009/10

	Area Planted for sugar ('000 acres)	Yield (st/acre)	Production ('000 st)	Price (est) (per ton)	Value of cane for sugar (millions)
Florida	370	35.9	13,283.0	$35.5	$471.7
Hawaii	15.5	77.1	1,195.1	$36.7	$43.8
Louisiana	390	32.2	12,558.0	$34.3	$431.1
Texas	36.7	36	1,321.2	$30.1	$39.7
Total US	**812.2**	**34.9**	**28,357.3**	**$34.8**	**$986.3**

Sources: USDA, ERS

Cane cultivation employment and wages

In table 3.2 we present the employment benefits from the cultivation of sugarcane in 2009/10 by state, distinguishing between the total amount of full-time and seasonal labor employed, as well as the total value of wages and benefits paid by state. In this table, just as with sugarbeets, part-time employees have been converted to a full-time equivalent basis.

From table 3.2 we observe that:

- There are a total of 739 independent cane farmers in the US and 518 unpaid family members adjusted to a full-time equivalent.

© LMC International, 2011

- This coupled, with 1,129 full-time employees and 312 seasonal workers employed on both family farms and on corporate farms in Florida and Hawaii, yields a total of nearly 4,200 jobs directly linked to sugarcane production and harvest.
- Given that Louisiana has several hundred family farms, it stands to reason that it employs the largest number of cane field workers of any state, estimated at 2,200 workers.
- Total wages and benefits paid, which excludes remuneration received from farmers and their family members, is equal to roughly $97 million.

Table 3.2: Employment and wages from sugarcane production, 2009/10

	Independent Farmers	Unpaid family members (fte)	Full-time paid labor	Part-time paid labor (fte)	Total paid labor	Total paid+unpaid cane workers	Wages and benefits paid (million)
Florida	107	0	711	312	1,023	1,130	$50.3
Hawaii	0	0	418	0	418	418	$15.5
Louisiana	510	408	na	na	1,276	2,194	$28.0
Texas	122	110	na	na	196	428	$2.9
Total US	**739**	**518**	**1,129**	**312**	**1,441**	**4,170**	**$96.8**

Sources: LMC estimates and cane sugar producers

Cane Milling

Cane milling, production and value

In table 2.3, we list the earnings of the cane milling sector on a state-by-state basis. We distinguish between the revenues generated from the production of raw sugar (which has been valued in each state at the New York No.16 price for raw sugar), coupled with the value of cane molasses and electricity sales.

In estimating the value of raw cane sugar production, we have taken into account the price premiums or discounts each cane producing region has over the New York No.16 price. This is because, in an efficient market, sugar is expected to flow primarily from sugar surplus to sugar deficit regions, and thus prices in deficit regions will be higher, in order to cover the costs of shipping, stevedoring and storage of sugar between regions.

Table 3.3: Value added from cane sugar production, 2009/10

	Value of Final Products (millions)	of which raw sugar (millions)	of which molasses (millions)	of which net electricity sold to grid (millions)	-	Value of sugarcane (millions)	=	Value Added (millions)
Florida	$1,202.0	$1,111.0	$70.4	$20.6		$471.7		$639.4
Hawaii 1/	$119.7	$109.5	$10.2	$0.0		$43.8		$65.6
Louisiana	$1,097.3	$1,035.0	$62.3	$0.0		$431.1		$603.9
Texas	$83.4	$75.5	$7.9	$0.0		$39.7		$35.7
Total US	**$2,502.3**	**$2,330.9**	**$150.8**	**$20.6**		**$986.3**		**$1,344.6**

Sources: LMC estimates and cane sugar producers
1. Hawaii's electricity sales were taken into account but were below a million dollars for 2009/10

© LMC International, 2011

From table 3.3 we also discover that:

- The value of products produced by the cane sugar industry exceeded $2.5 billion in 2009/10. Just as with beet sugar, this is a substantial increase from previous studies and is a reflection of the trend in higher commodity prices in general and higher US sugar prices in particular. Of the total value of production, $2.3 billion dollars comes from sugar, $150 million from molasses and $21 million from net sales of electricity.

- Subtracting a total value for sugarcane of $986 million, the total direct value added from raw cane sugar production is 1.34 billion dollars.

Cane milling – employment and wages

Details of employment and wages within the US cane milling sector for 2009/10 are contained in table 3.4. Again we distinguish between full-time and seasonal workers. In the case of Hawaii, there is no distinction between seasonal and full-time labor, since the sugar industry in that state enjoys year-round milling, and hence employs labor all year round.

Key points to note from table 3.4 include:

- For 2009/10 there were approximately 2,300 full-time and 500 part-time workers employed in the US cane milling sector.

- The Louisiana industry has the largest total workforce, with 998 permanent and 365 seasonal workers.

- The total wage bill of US cane milling companies totaled $150.7 million in 2009/10.

Table 3.4: Employment and wages paid from cane sugar production, 2009/10

	Full-time	Part-time	Total	Total Compensation (millions)
Florida	918	104	1,022	$62.5
Hawaii	191	0	191	$12.6
Louisiana	998	365	1,363	$69.4
Texas	175	13	188	$6.2
Total	**2,282**	**481**	**2,763**	**$150.7**

Sources: LMC estimates and cane sugar producers

Multiplier Effects

Just as we did with the beet sugar industry, the economic impact of the cane sugar industry to the economy at large has been estimated with the use of economic multipliers. Fortunately, the US Department of Commerce has estimated unique multiplier effects for cane and beet sugar processing.

- From table 3.5 we see that the direct economic impact for sugarcane production is just under $990 million, while for raw cane sugar production it is 1.34 billion. These figures are derived from tables 3.1 and 3.3 and when combined equal an economic impact of raw cane sugar production of 2.33 billion dollars.

© LMC International, 2011

- The indirect economic impact from all facets of raw cane sugar production on the total economy is $2.17 billion, while the induced impact, which is from purchases made by employees, is $904 million.
- This implies that the total economic impact from raw cane sugar production in the US, with direct and induced effects included, is $5.4 billion.
- For table 3.6 we observe that direct employment generated by sugarcane production is 4,170 jobs, while for cane sugar production it is 2,763 jobs. These figures are derived from tables 3.2 and 3.4 and when combined equal a total direct employment impact of just under 6,934 jobs.
- The indirect employment impact from raw cane sugar production on the total economy is 12,545 jobs, while the induced impact is 7,585 jobs.
- This implies that the total impact on employment from all facets of raw cane sugar production in the US, with direct and induced effects included, is just over 27,000 jobs.
- Table 3.7 presents the direct, indirect and induced impacts on wages from the raw cane sugar industry in the US. The direct impact on wages is $97 million on the field side and $150 million on the factory side. These two figures were first presented in tables 3.2 and 3.4.
- When combined with an indirect effect on wages of $416 million and an induced effect of $216 million, the total impact on wages from raw cane sugar production is calculated to be $880 million dollars.

© LMC International, 2011

Table 3.5: Value added from raw cane sugar production – direct, indirect and induced impacts

	TOTAL				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Florida	$1,111.0	$968.9	$463.0	$2,543.0	$471.7	$302.5	$186.9	$961.0	$639.4	$666.5	$276.1	$1,582.0
Hawaii	$109.5	$86.7	$13.6	$209.8	$43.8	$24.3	$13.6	$81.8	$65.6	$62.4	$0.0	$128.0
Louisiana	$1,035.0	$1,030.0	$386.6	$2,451.5	$431.1	$317.9	$149.4	$898.4	$603.9	$712.0	$237.1	$1,553.0
Texas	$75.5	$79.7	$41.1	$196.3	$39.7	$34.0	$20.5	$94.2	$35.7	$45.8	$20.5	$102.0
Total	**$2,330.9**	**$2,165.4**	**$904.2**	**$5,400.5**	**$986.3**	**$678.7**	**$370.4**	**$2,035.4**	**$1,344.6**	**$1,486.7**	**$533.8**	**$3,365.1**

Table 3.6: Employment from cane sugar production – direct, indirect and induced impacts

	TOTAL				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Florida	2,153	4,927	3,213	10,292	1,130	1,520	907	3,557	1,022	3,407	2,306	6,734
Hawaii	609	657	160	1,426	418	278	160	856	191	379	0	570
Louisiana	3,557	5,634	3,226	12,417	2,194	1,899	1,139	5,232	1,363	3,735	2,087	7,185
Texas	615	1,327	986	2,929	428	475	353	1,256	188	853	633	1,673
Total	**6,934**	**12,545**	**7,585**	**27,063**	**4,170**	**4,172**	**2,559**	**10,902**	**2,763**	**8,373**	**5,025**	**16,161**

Table 3.7: Wages paid from cane sugar production – direct, indirect and induced impacts

	TOTAL				FIELD				FACTORY			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Florida	$112.8	$181.6	$107.5	$401.9	$50.3	$63.2	$41.4	$155.0	$62.5	$118.4	$66.0	$246.9
Hawaii	$28.1	$36.0	$9.8	$73.9	$15.5	$15.2	$9.8	$40.5	$12.6	$20.8	$0.0	$33.4
Louisiana	$97.4	$180.1	$87.3	$364.7	$28.0	$35.5	$20.0	$83.5	$69.4	$144.5	$67.3	$281.2
Texas	$9.1	$18.8	$11.6	$39.5	$2.9	$4.4	$3.0	$10.4	$6.2	$14.4	$8.5	$29.1
Total	**$247.4**	**$416.5**	**$216.1**	**$880.0**	**$96.8**	**$118.3**	**$74.2**	**$289.3**	**$150.7**	**$298.1**	**$141.8**	**$590.7**

© LMC International, 2011

Section 4 – Cane Sugar Refining and Marketing

This section deals with the economic impact and employment from the US sugar refining industry and its marketing arm. Collectively, these two elements process raw cane sugar into an edible product and oversee sales to the end-user.

Refining Production and Value

In table 4.1, we present state-by-state information on the production of refined sugar by state. While this data is not reported by the USDA, it is generally reported by refiners themselves through news releases, 10K reports and data on raw sugar deliveries. While we have aggregated refiner data in table 4.2 for employees and wages paid to preserve confidentiality, we have not aggregated the data in table 4.1 because of its public availability. The value of sugar and molasses produced by the refiners is calculated as a function of 2009/10 production, the Midwest white sugar price, and the USDA blackstrap molasses price. For this study we have not distinguished between domestic raw sugar and imported raw sugar, and consequently our economic impact and employment figures represent the entirety of output from US refineries, regardless of the source of raw sugar.

- For 2009/10, the total value of refinery output was $5.35 billion, which includes $5.33 billion from sugar and $12 million dollars from molasses.
- When the cost of raw sugar purchases is taken into account, the value added by the US refining sector is calculated at $1.46 billion.
- The states with the largest impact from refining, Louisiana and Florida, are home to multiple refineries. The direct economic impact to the economy of Louisiana is estimated at $417 million, while for Florida it is estimated at $294 million.

Table 4.1: Acreage, production and value added from sugarcane production, 2009/10

	Value of Final Products (millions)	of which refined sugar (millions)	of which molasses (millions)	- Value of raw sugar (millions)	= Value Added (millions)
California	$689.8	$687.5	$2.3	$500.8	$189.0
Florida	$1,081.8	$1,081.3	$0.5	$787.6	$294.2
Georgia	$630.4	$628.3	$2.1	$457.6	$172.8
Louisiana	$1,523.7	$1,519.5	$4.2	$1,106.8	$417.0
Maryland	$848.0	$846.1	$1.9	$616.3	$231.7
New York	$576.5	$575.4	$1.2	$419.1	$157.4
Total	**$5,350.2**	**$5,338.1**	**$12.1**	**$3,888.2**	**$1,462.0**

Sources: LMC estimates and study questionnaires

Refining Employment and Wages

In table 4.2 we present the employment benefits from the refining sector aggregated to preserve confidentiality among the companies. While refining operations themselves are concentrated in just eight facilities, there are many more facilities involved in bringing this sugar to market. Employment at these facilities, which includes sales offices and warehouses among others, has been grouped with the New York, Maryland and Georgia refineries. The other two aggregations include 1) California and Louisiana, home to three refineries in total, and 2) Florida, which is home to two refineries owned by separate entities.

© LMC International, 2011

From table 4.2 we observe that:

- Total direct employment in cane sugar refining and marketing is just under 3,000 individuals. This includes roughly 2,300 individuals working in refineries, 529 individuals working in administration and marketing and 166 individuals working in other facilities. All of these jobs are full-time.
- Total compensation paid for jobs in cane sugar refining and marketing is $255 million.

© LMC International, 2011

Table 4.2: Employment and wages from sugarcane production, 2009/10

	Total Sugar Processing and Admin		Refinery		Admin and Marketing		Other facilities	
	Total	Total Compensation (millions)	Total	Total Compensation (millions)	Total	Total Compensation (millions)	Total	Total Compensation (millions)
Florida	307	$24.9	195	$12.2	112	$12.6	0	$0.0
California and Louisiana	1,262	$109.1	1,141	$96.4	112	$12.1	9	$0.6
New York, Maryland and Georgia as well as smaller marketing facilities throughout US	1,424	$121.1	962	$75.7	306	$35.9	157	$9.5
Total	**2,992**	**$255.0**	**2,298**	**$184.3**	**529**	**$60.7**	**166**	**$10.0**

Sources: LMC estimates and cane sugar producers

© LMC International, 2011

Multiplier Effects

The Department of Commerce developed one set of multipliers for cane sugar milling and refining, meaning the multipliers used in this section are the same as in section 2, albeit for different states.

- In table 4.3, we begin by reiterating the direct economic impact from the refining sector given in table 4.1, $1.46 billion.
- Applying the DoC multipliers, we calculate an indirect economic impact of $1.47 billion dollars and an induced impact of over $580 million dollars.
- This implies that the total economic impact from raw cane sugar production in the US, with direct and induced effects included, is $3.5 billion.

Table 4.3: Value added from raw cane sugar production – direct, indirect and induced impacts

	REFINERY and MARKETING			
	Direct	Indirect	Induced	Total
Florida	$294.2	$306.6	$127.0	$727.8
California and Louisiana	$606.0	$703.8	$260.0	$1,569.8
New York, Maryland and Georgia as well as smaller marketing facilities throughout US	$561.9	$463.6	$196.8	$1,222.3
Total	**$1,462.0**	**$1,474.0**	**$583.9**	**$3,519.9**

Sources: LMC estimates and USDoC RIMS II database

- In table 4.4, we again start by reiterating the direct employment impact from the refining sector given in table 4.2, 2,992 jobs.
- The indirect employment impact from cane sugar refining and marketing on the total economy is 7,693 jobs, while the induced impact is 5,197 jobs.
- This implies that the total impact on employment from all facets of raw cane sugar production in the US, with direct and induced effects included, is just under 16,000 jobs.

© LMC International, 2011

Table 4.4: Employment from cane sugar production – direct, indirect and induced impacts

	REFINERY and MARKETING			
	Direct	Indirect	Induced	Total
Florida	307	1,022	691	2,020
California and Louisiana	1,262	3,632	2,287	7,180
New York, Maryland and Georgia as well as smaller marketing facilities throughout US	1,424	3,040	2,219	6,683
Total	**2,992**	**7,693**	**5,197**	**15,883**

Sources: LMC estimates and USDoC RIMS II database

We conclude with table 4.5 which begins with the direct impact on wages for cane sugar and refining of 256 million dollars, which was first presented in table 4.2.

- When combined with an indirect effect on wages of $457 million and an induced effect of $247 million, the total impact on wages from raw cane sugar production is calculated to be $961 million dollars.

Table 4.5: Wages paid from cane sugar production – direct, indirect and induced impacts

	REFINERY and MARKETING			
	Direct	Indirect	Induced	Total
Florida	$24.9	$47.1	$26.3	$98.3
California and Louisiana	$109.1	$227.1	$118.1	$454.3
New York, Maryland and Georgia as well as smaller marketing facilities throughout US	$122.4	$182.9	$103.0	$408.2
Total	**$256.3**	**$457.1**	**$247.4**	**$960.8**

Sources: LMC estimates and USDoC RIMS II database

© LMC International, 2011

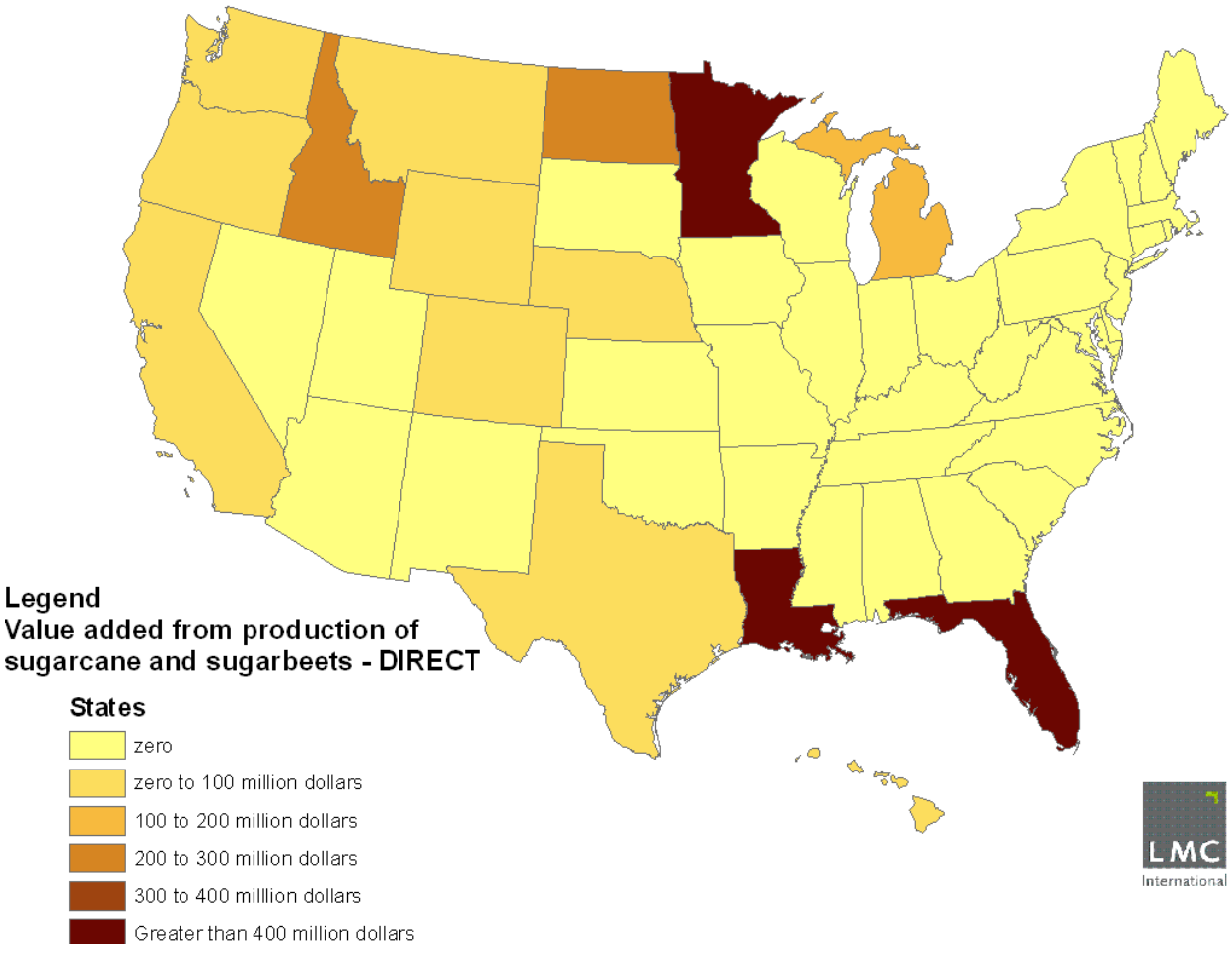
Annex I – Maps of State-level Results

In this annex we illustrate our findings as maps. Because data is presented as ranges, we are able to provide state-level detail without sacrificing confidentiality of company-specific information. Maps A1 through A9 present direct impacts while maps A10 through A18 present the total impact (direct + indirect + induced) on the economy, employment and wages.

Note: that while there is a "value added" impact in 14 states there is an employment and wage impact in 21 states. These additional 7 seven states (Illinois, Iowa, Kentucky, New Jersey, Ohio, Tennessee and Utah) are home to important storage and marketing operations of the US sugar industry, wherein individuals are employed and wages paid. However, no sugar production or value added activity such as refining takes place in these states at a substantive level.

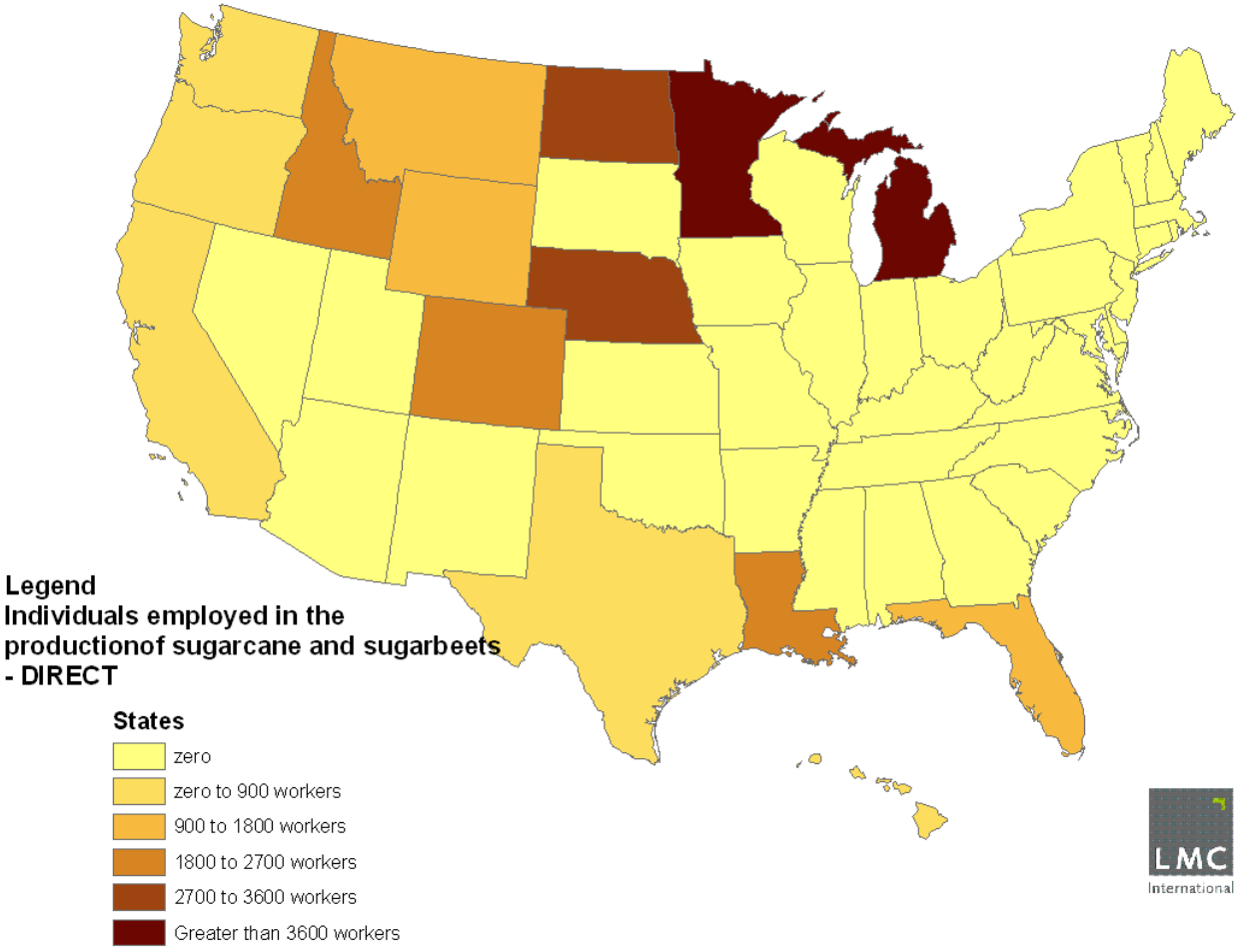
Direct Impacts

Map A1: Value added from production of sugarcane and sugarbeets – DIRECT
US Total = 2.37 billion dollars



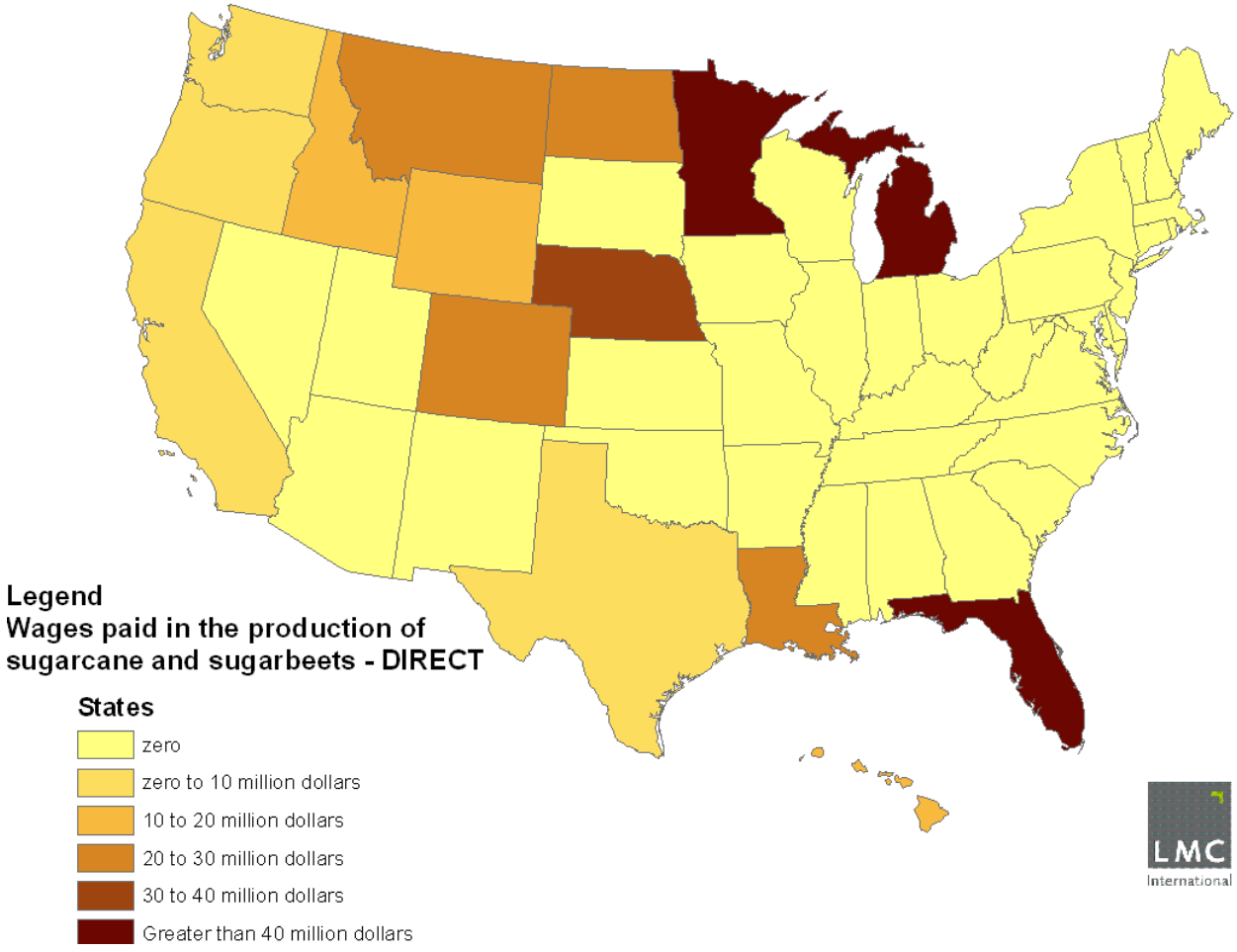
© LMC International, 2011

Map A2: Individuals employed in sugarcane and sugarbeet production – DIRECT
US Total = 28,393 individuals



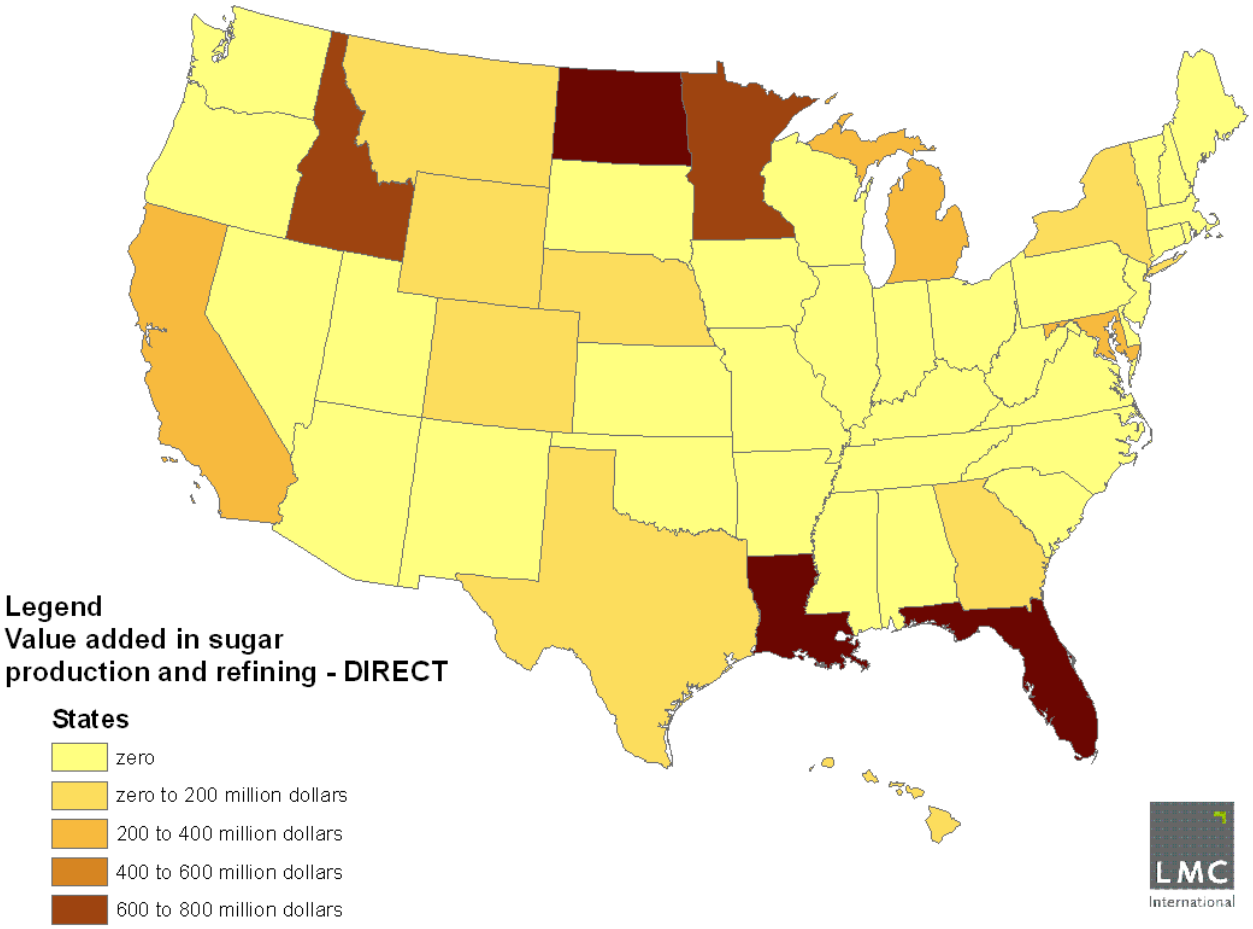
© LMC International, 2011

Map A3: Wages paid in the production of sugarcane and sugarbeets – DIRECT
US Total = 346 million dollars



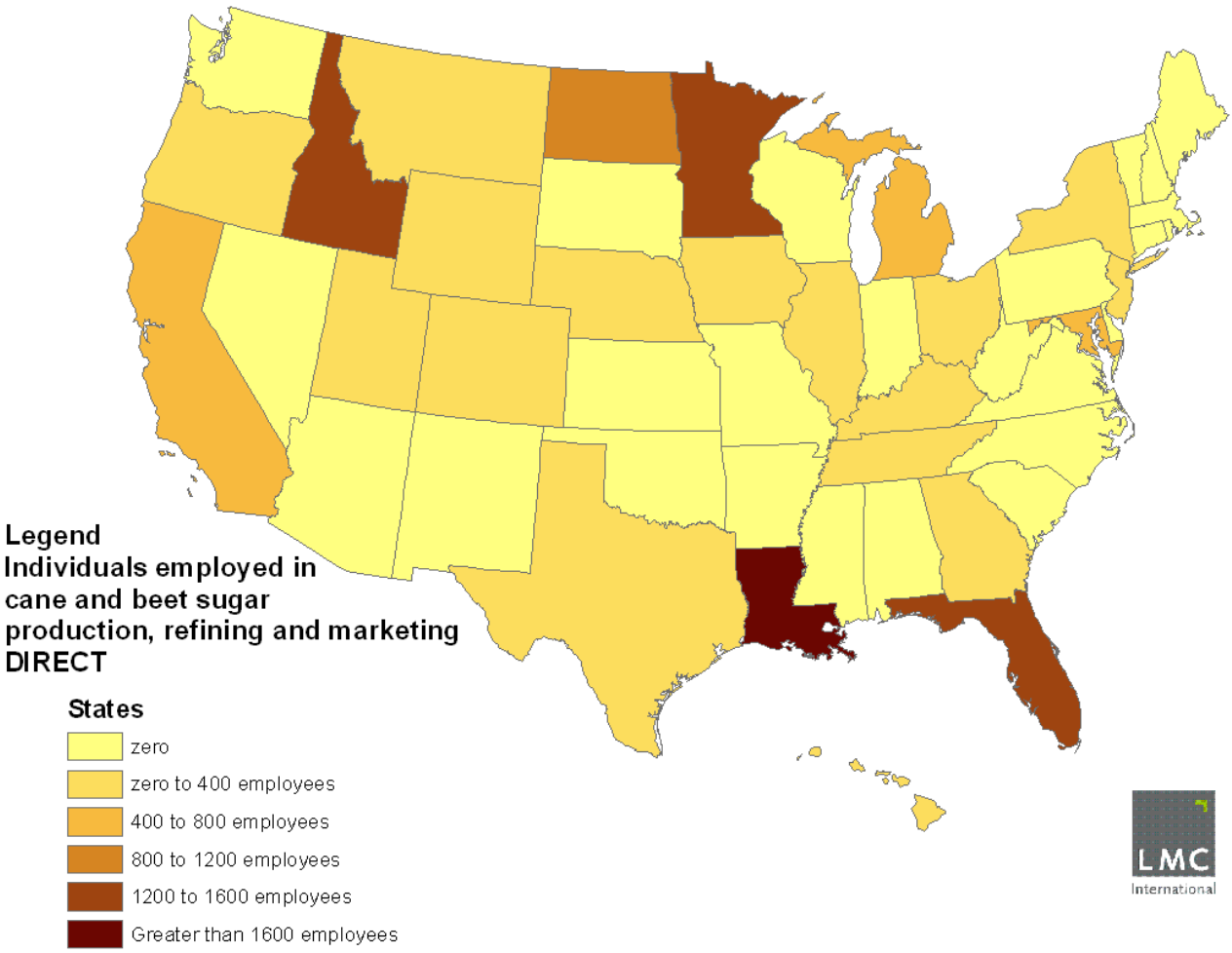
© LMC International, 2011

Map A4: Value added in sugar production and refining – DIRECT
US Total = 6.03 billion dollars

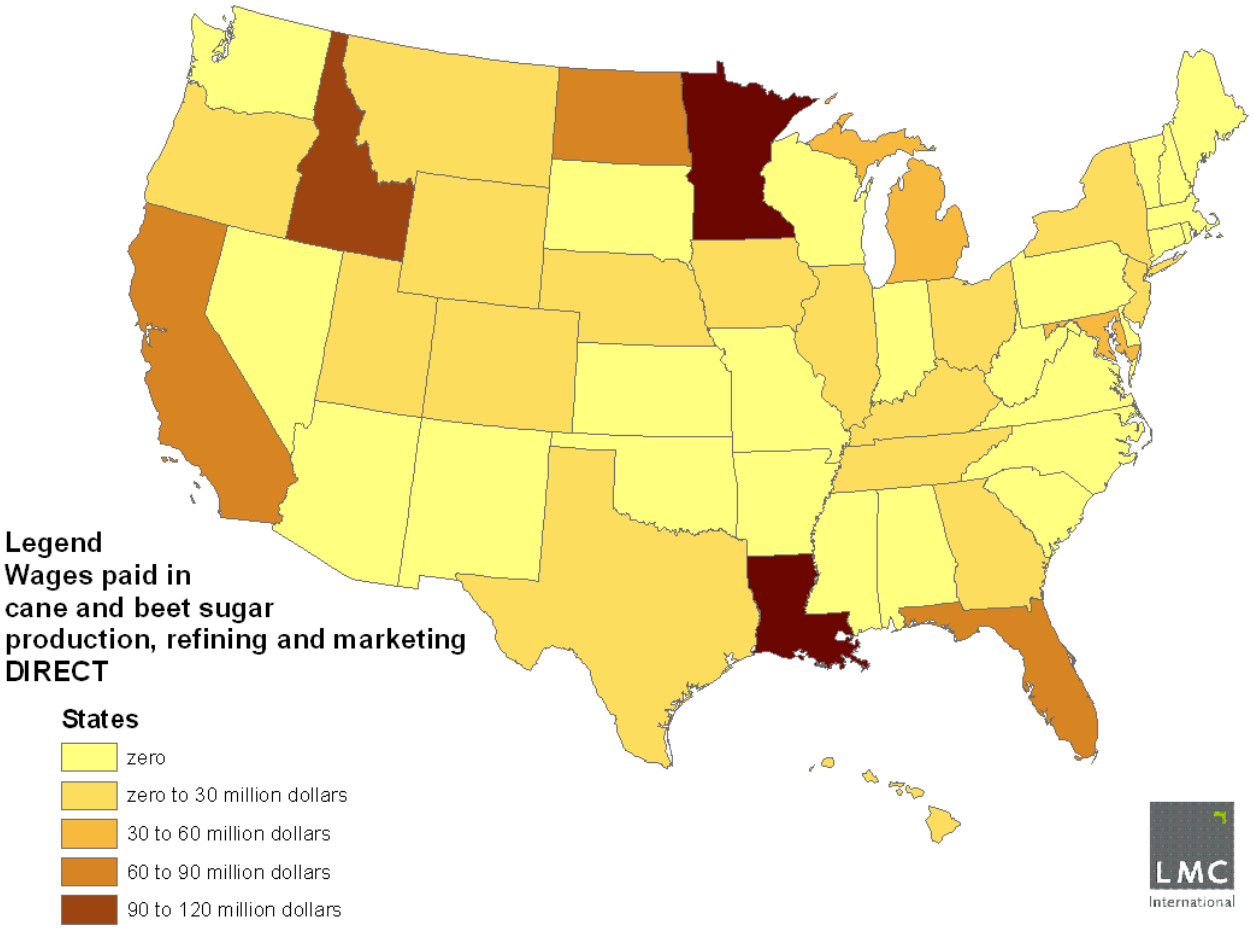


© LMC International, 2011

Map A5: Individuals employed in cane and beet sugar production, refining and marketing – DIRECT
US Total = 11,564 individuals

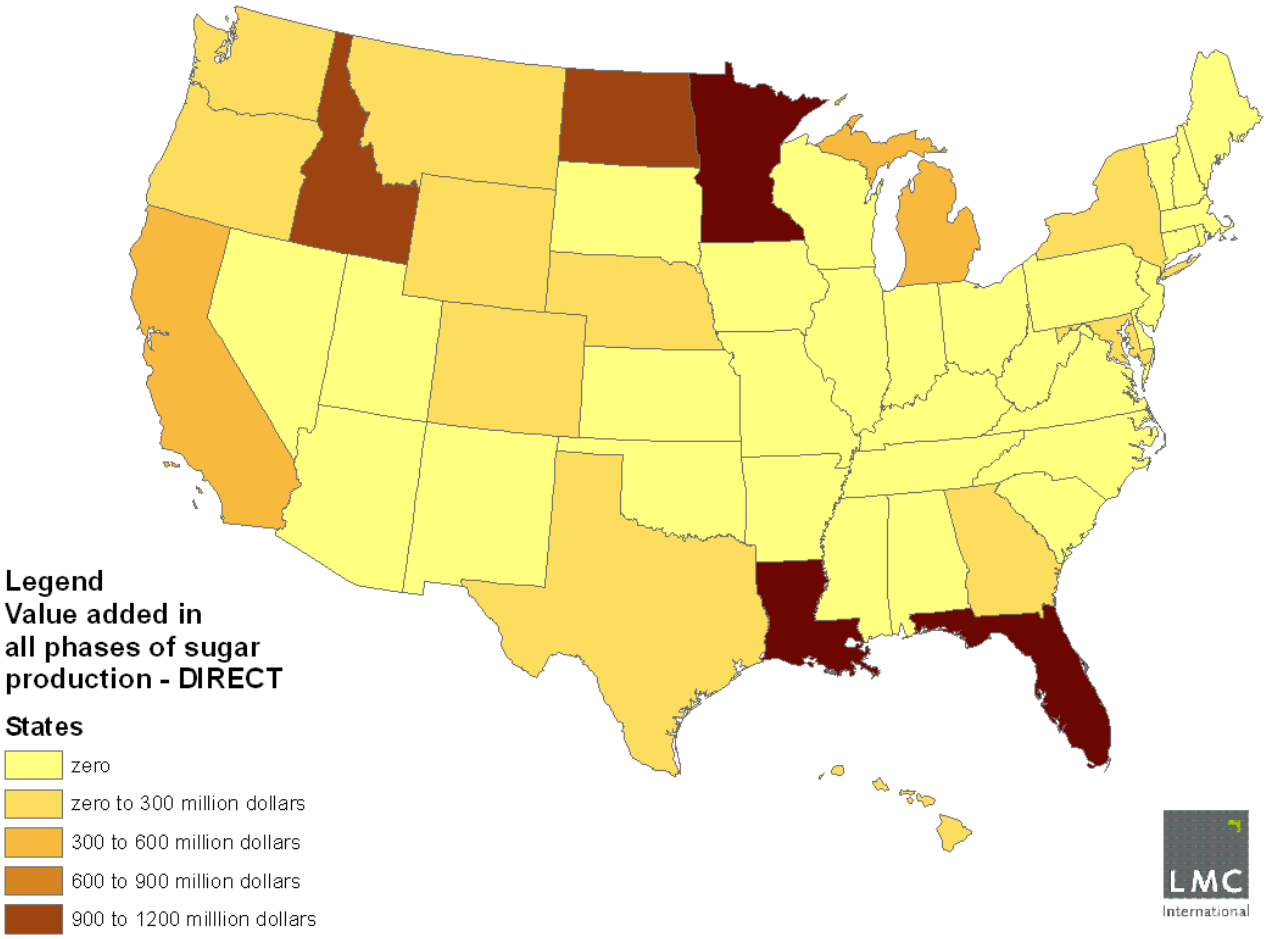


Map A6: Wages paid in cane and beet sugar production, refining and marketing – DIRECT
US Total =826 million dollars

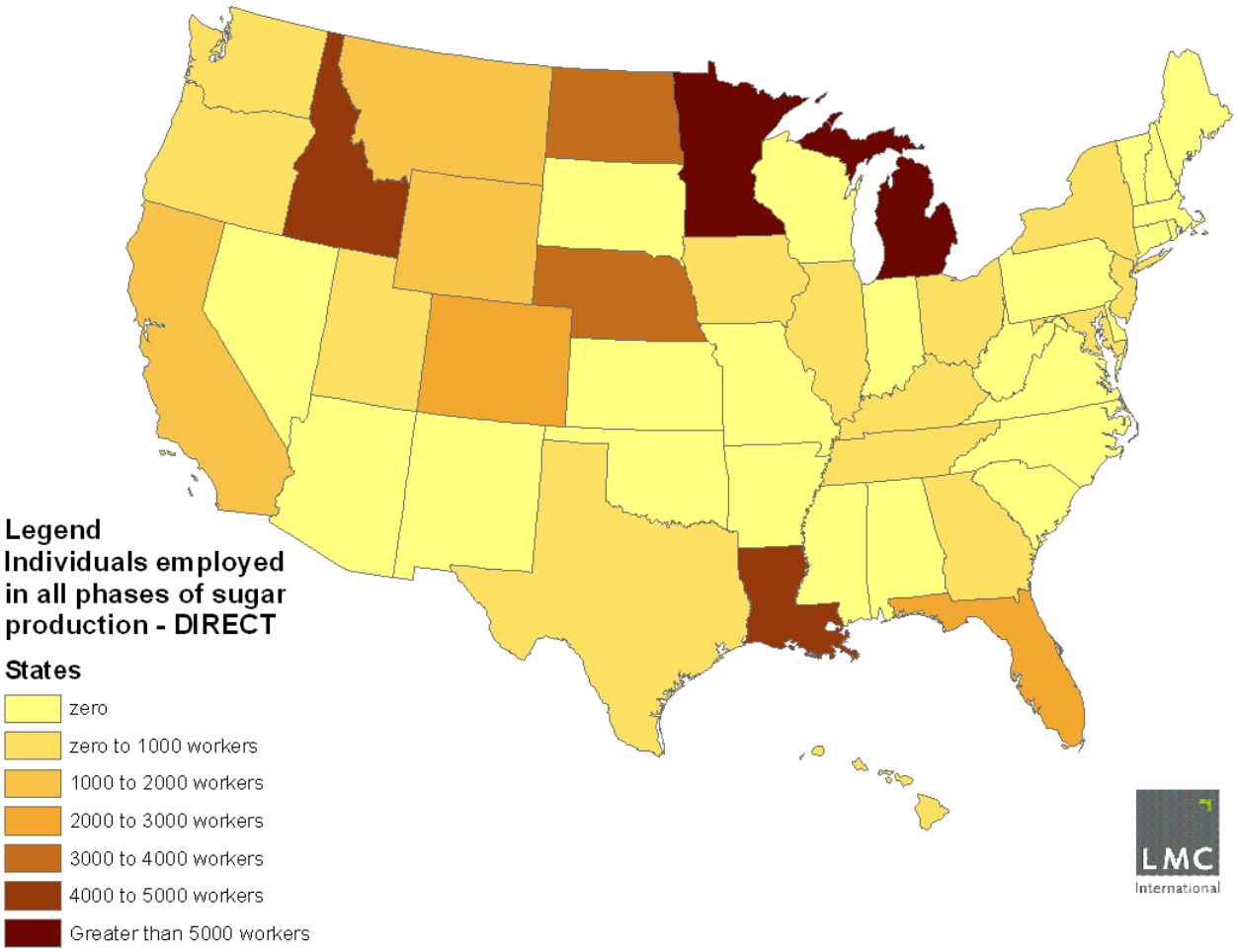


© LMC International, 2011

Map A7: Value added in all phases of sugar production – DIRECT
US Total = 8.4 billion dollars

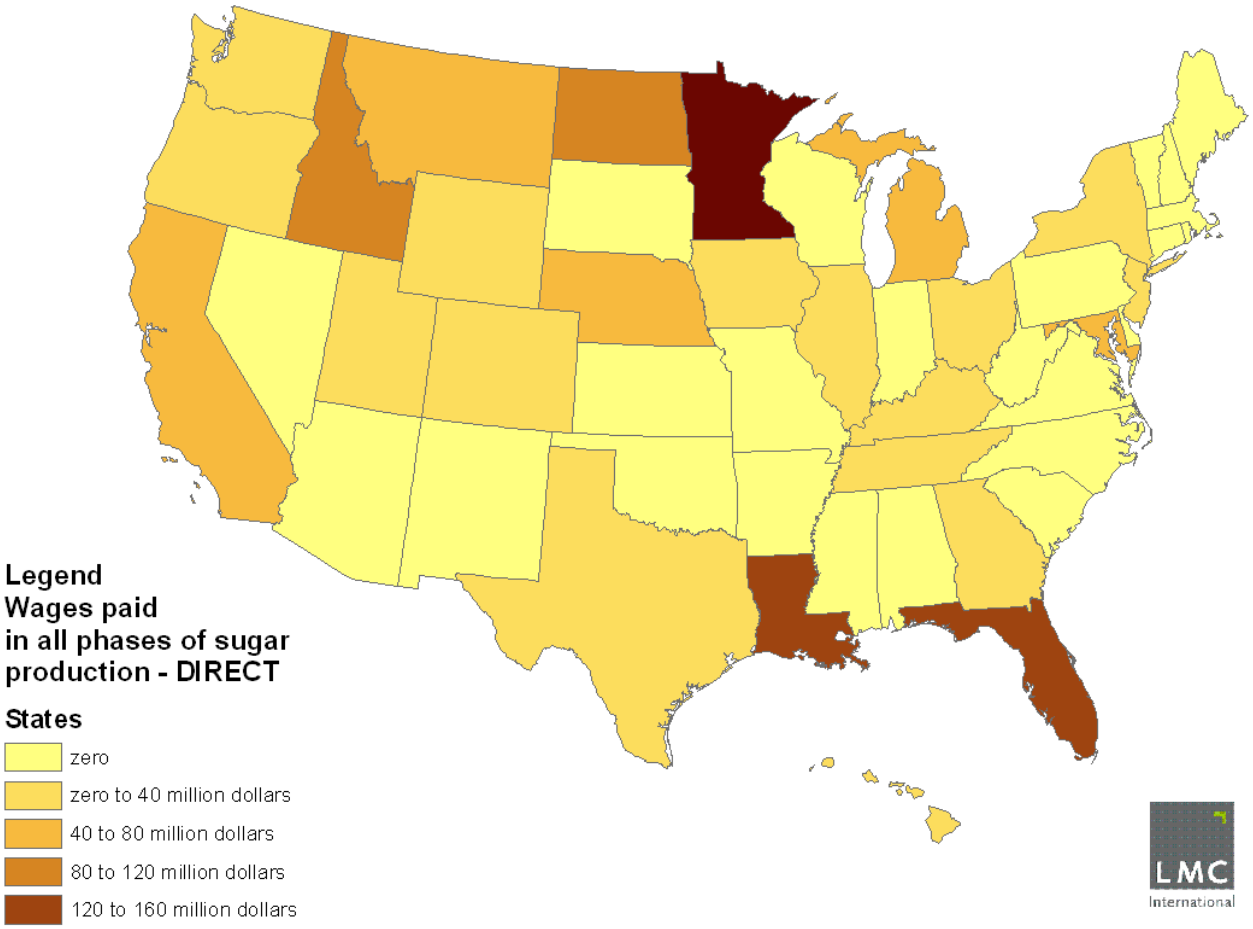


Map A8: Individuals employed in all facets of sugar production, refining and marketing – DIRECT
US Total = 39,958 individuals



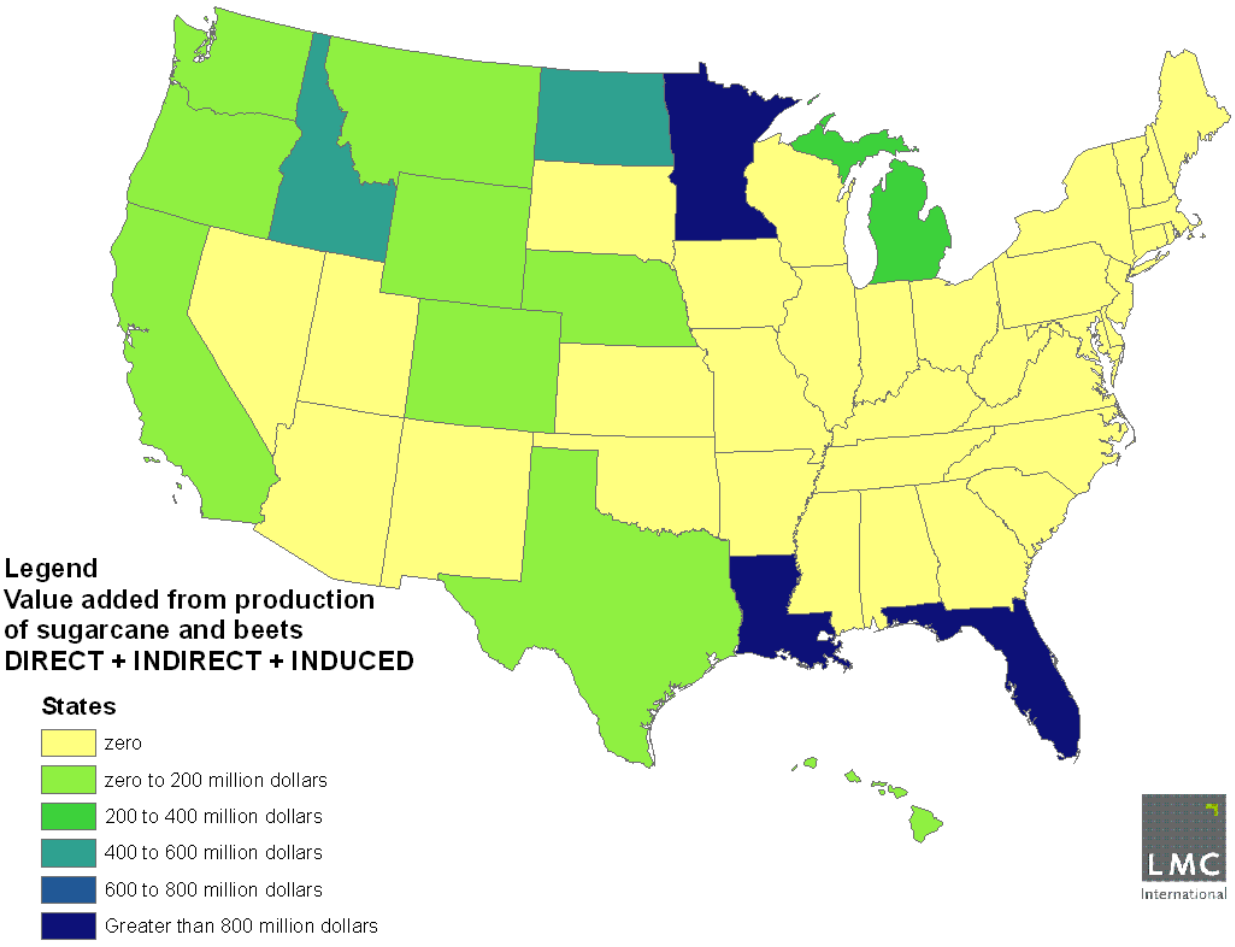
© LMC International, 2011

Map A9: Wages paid in the production, refining and marketing of all sugar – DIRECT
US Total = 1.17 billion dollars



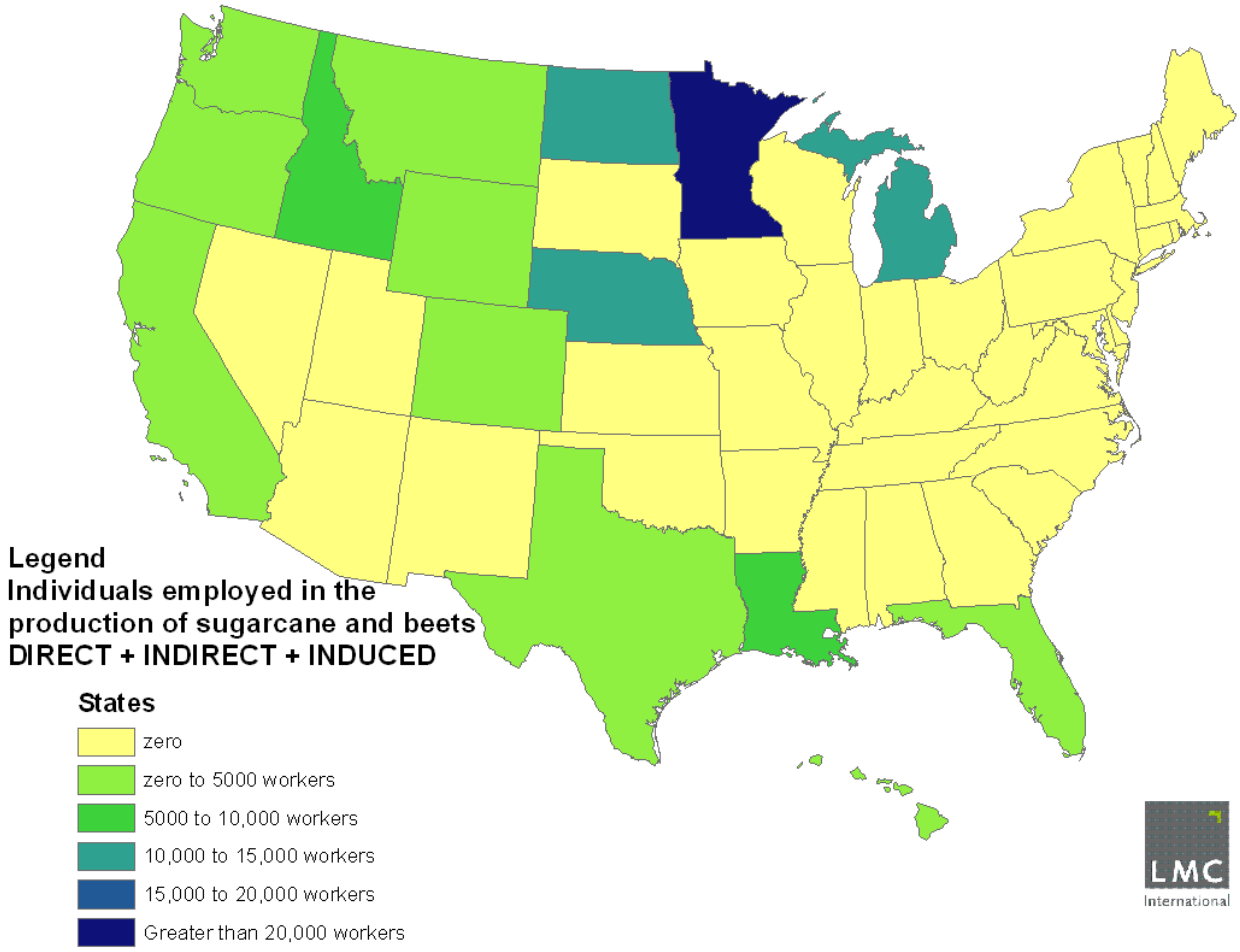
Direct + Indirect + Induced Impacts

Map A10: Economic impact from the production of sugarcane and sugarbeets – DIRECT + INDIRECT + INDUCED
US Total = 4.74 billion dollars



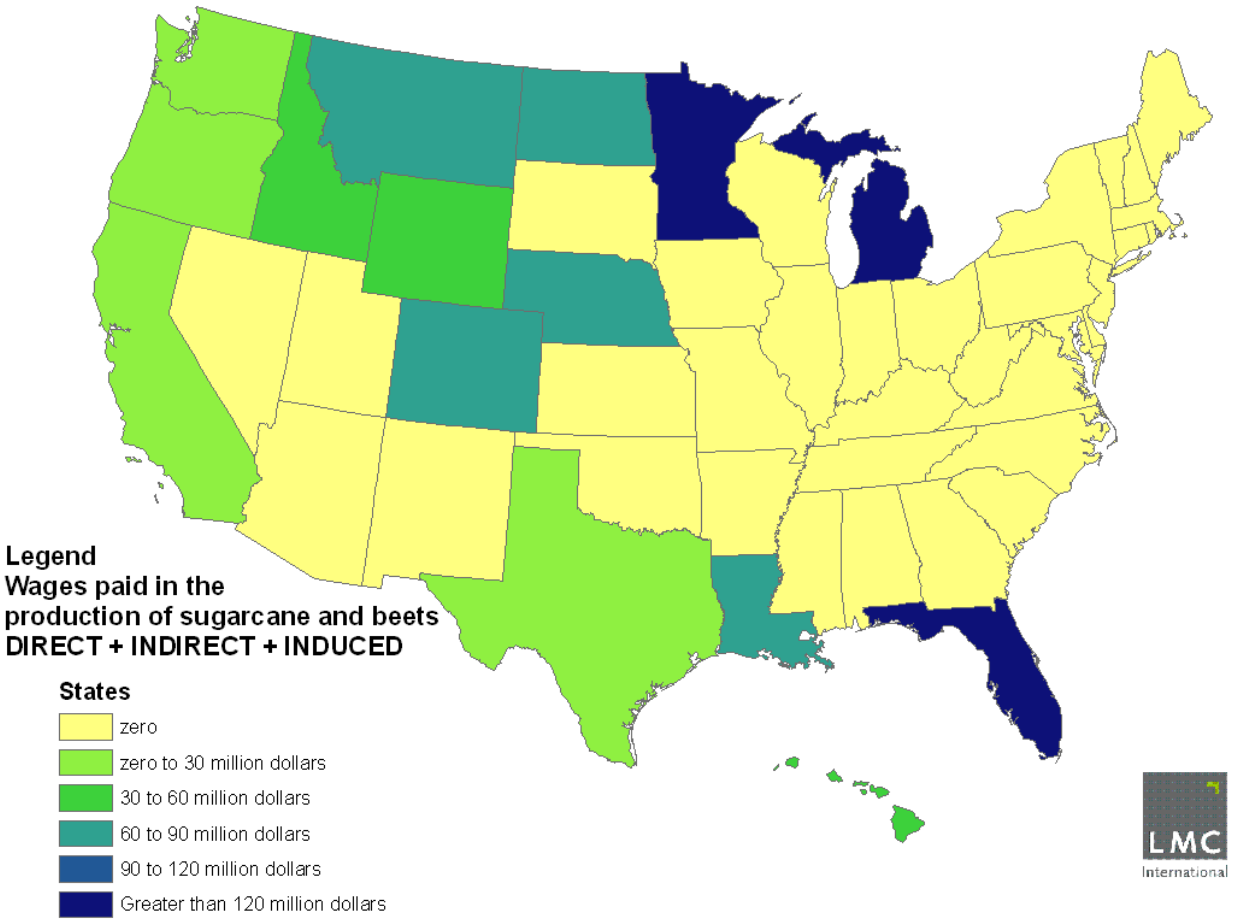
© LMC International, 2011

Map A11: Employment impact from sugarcane and sugarbeet production – DIRECT + INDIRECT + INDUCED
US Total = 83,698 individuals



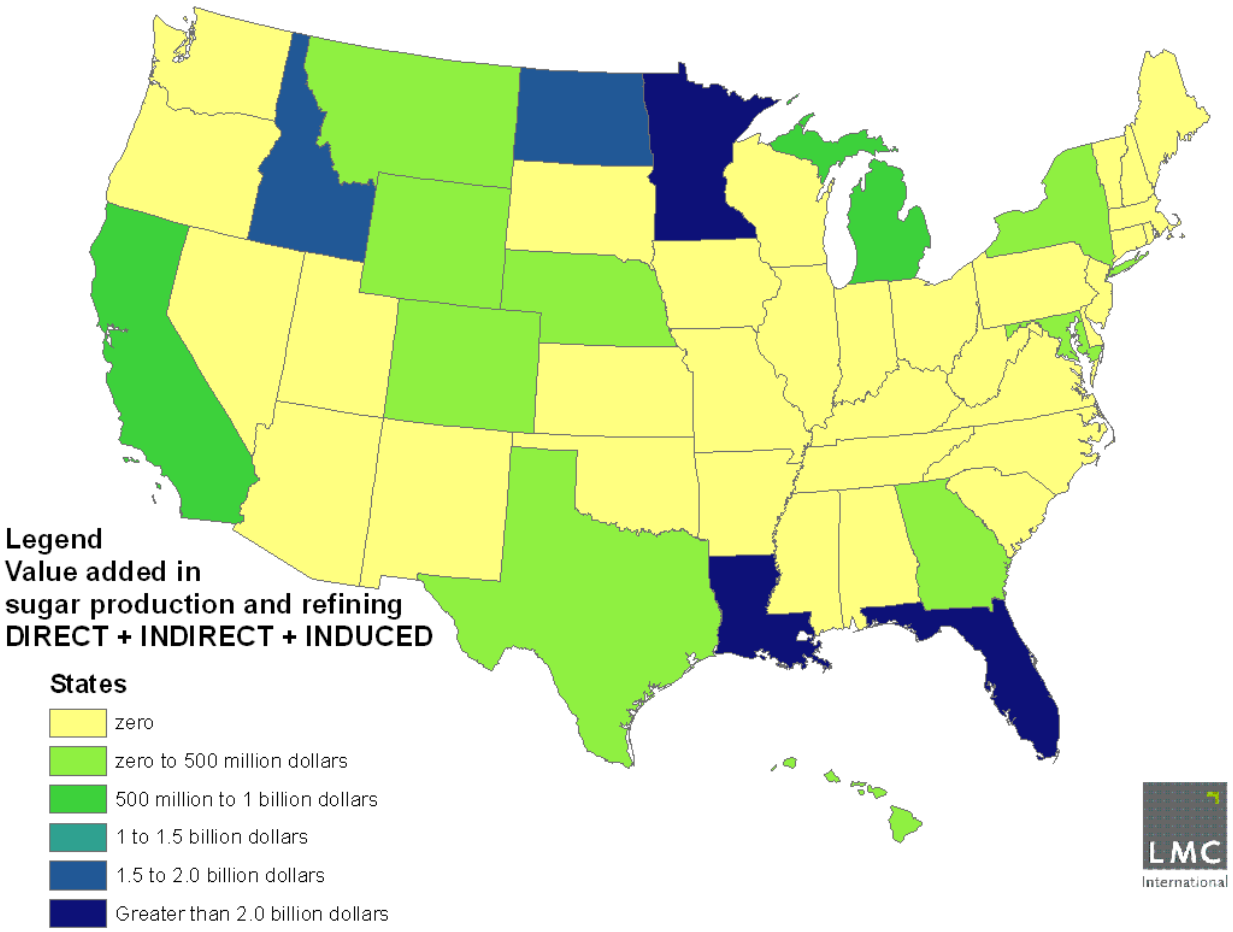
© LMC International, 2011

Map A12: Wage impact from the production of sugarcane and sugarbeets – DIRECT + INDIRECT + INDUCED
US Total = 971 million dollars



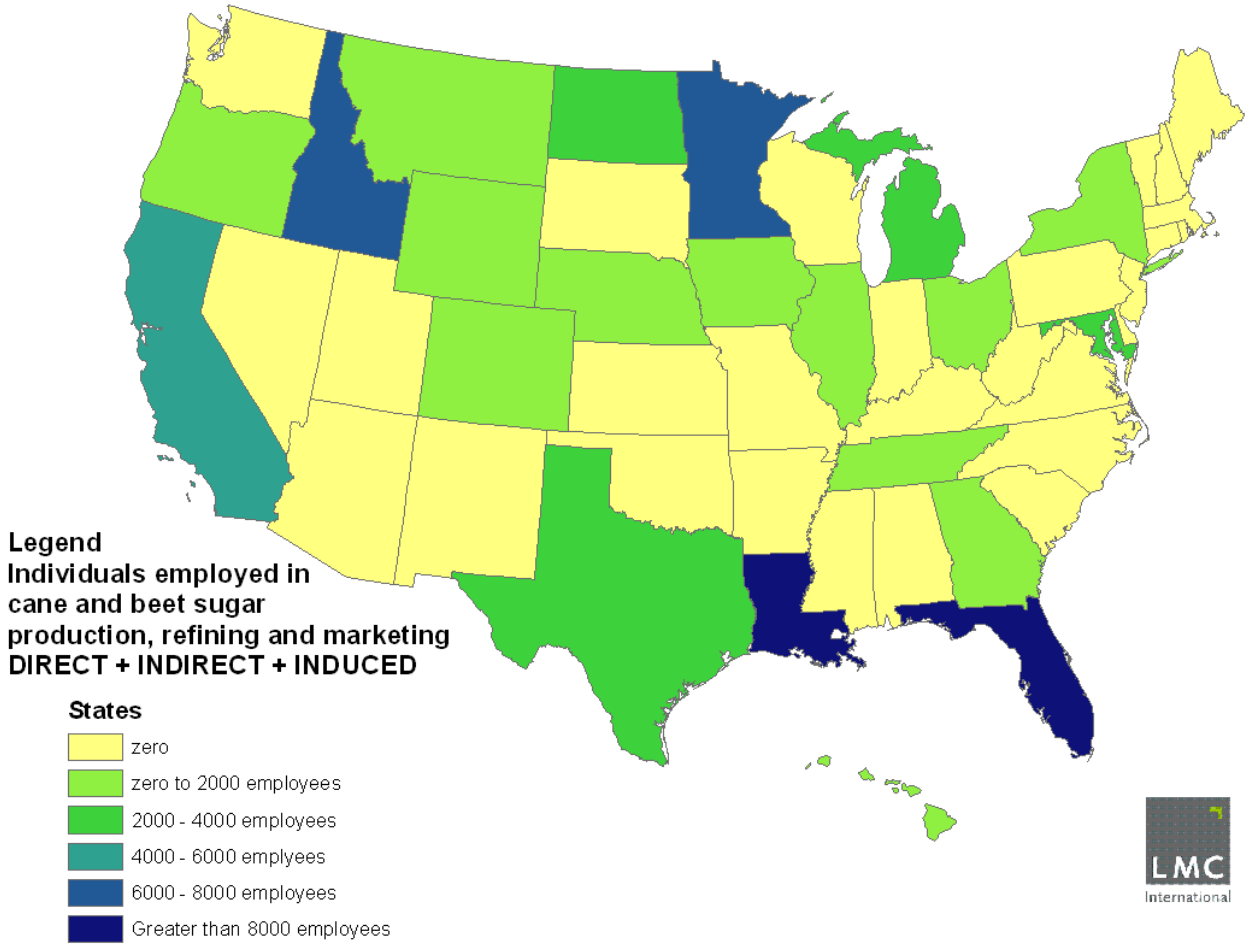
© LMC International, 2011

Map A13: Economic impact from sugar production and refining – DIRECT + INDIRECT + INDUCED
US Total = 14.67 billion dollars



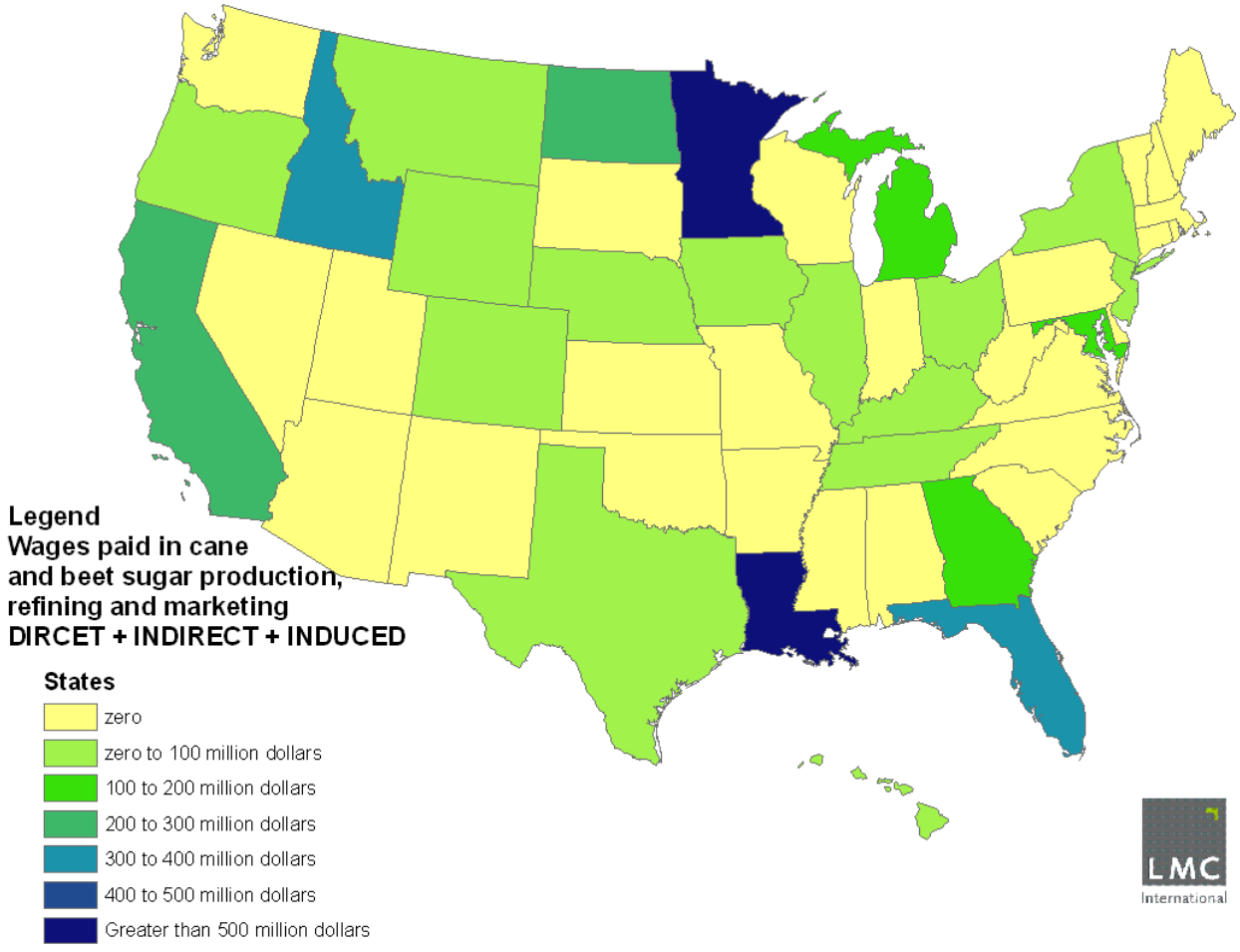
© LMC International, 2011

Map A14: Employment impact from cane and beet sugar production, refining and marketing – DIRECT + INDIRECT + INDUCED
US Total = 58,764 individuals



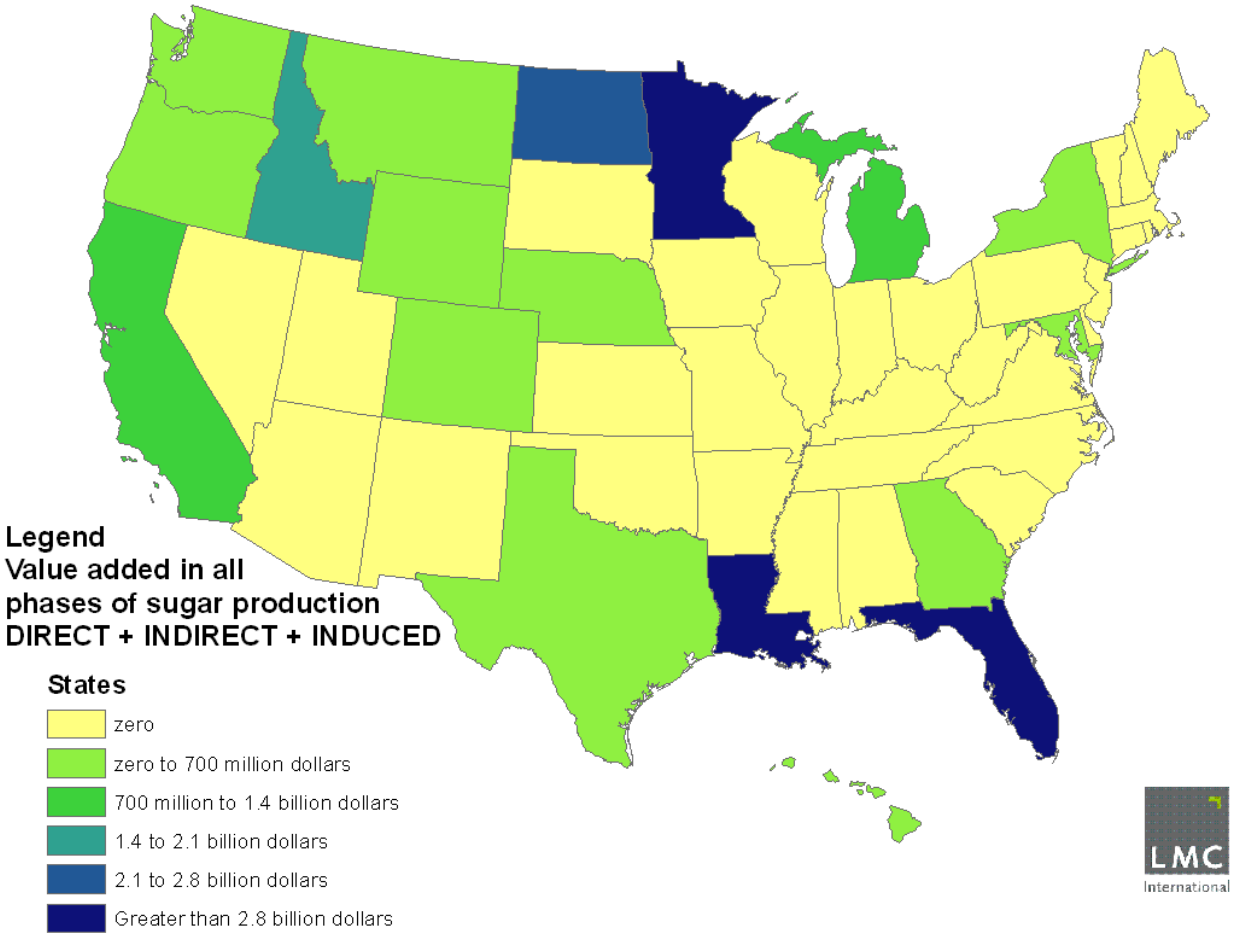
© LMC International, 2011

Map A15: Wage impact from cane and beet sugar production, refining and marketing – DIRECT + INDIRECT + INDUCED
US Total = 3.2 billion dollars



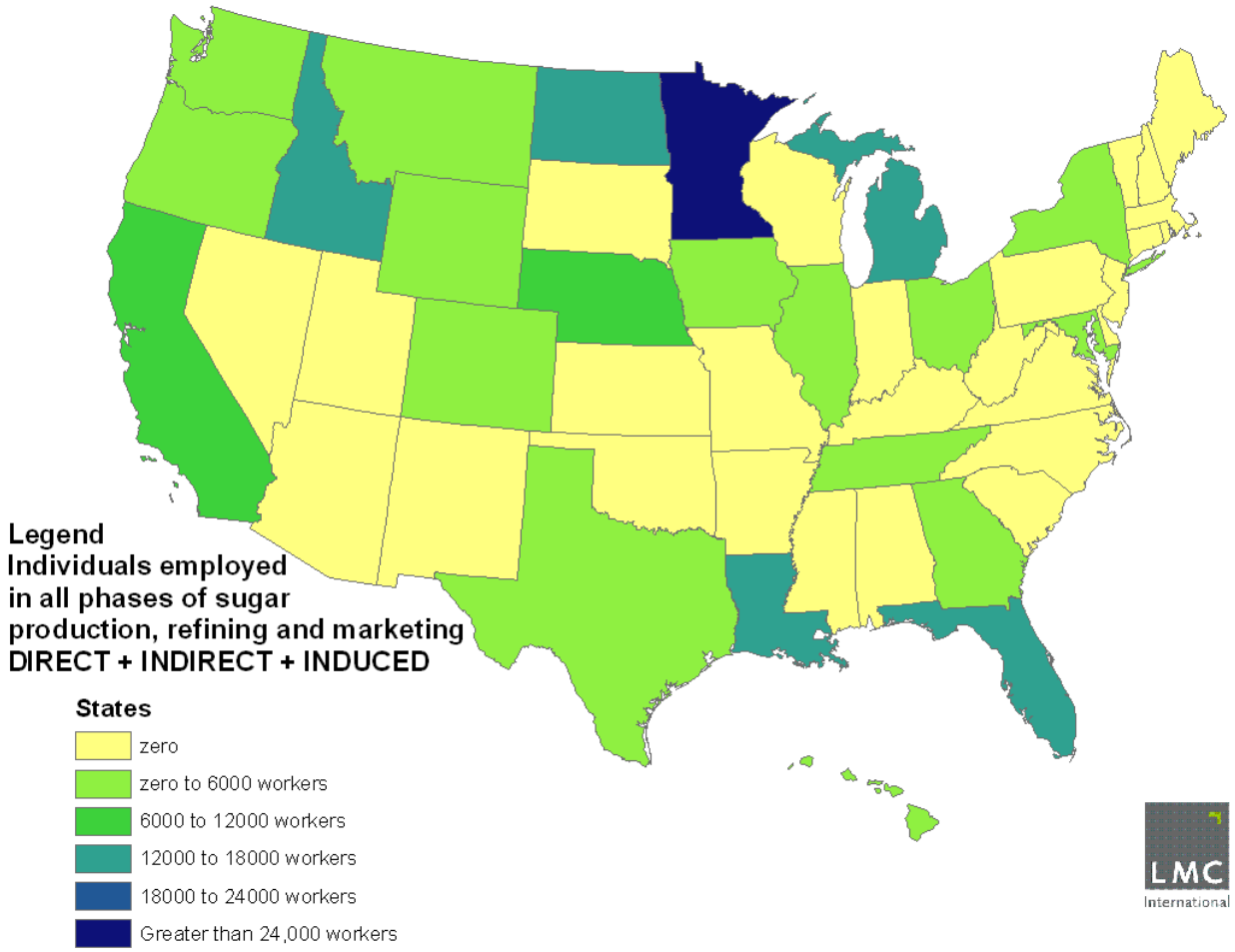
© LMC International, 2011

Map A16: Economic impact from all phases of sugar production – DIRECT + INDIRECT + INDUCED
US Total = 19.5 billion dollars



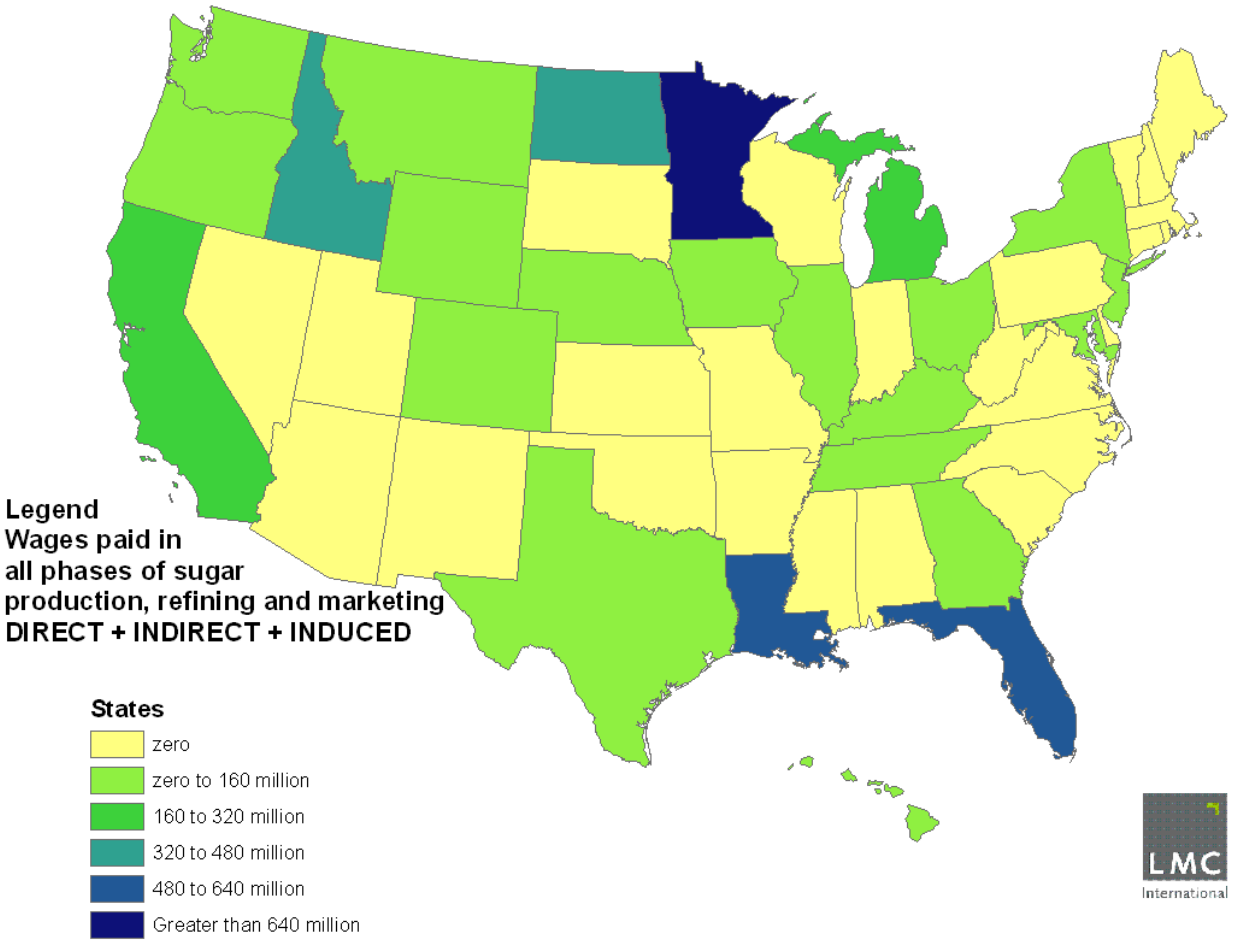
© LMC International, 2011

Map A17: Employment impact from all facets of sugar production, refining and marketing – DIRECT + INDIRECT + INDUCED
US Total = 142,457 individuals



© LMC International, 2011

Map A18: Wage impact from the production, refining and marketing of all sugar – DIRECT + INDIRECT + INDUCED
US Total = 4.18 billion dollars



© LMC International, 2011