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BAILING OUT ON AMERICA Air Force tanker decision will ground at least 14,000 U.S. jobs

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Instead of selecting a competing proposal from the U.S.-based Boeing Company, the U.S. Air Force awarded a \$35 billion contract in February to Northrop Grumman, who has teamed with European-based Airbus, to supply 179 air refueling tankers.¹ This contract will provide replacements for its ageing fleet of 500 KC-135 tankers, which first entered into service in the 1950s. The Air Force expects to replace its entire tanker fleet, at an ultimate cost of up to \$100 billion, making this the third largest contract in its history.² The Northrop Grumman (NG) tanker will use airframes manufactured by Airbus, a unit of the European Aeronautic Defense and Space Company (EADS). Because roughly half of the parts and labor that go into making the NG/Airbus tankers will come from overseas, at least 14,000 jobs that could have been generated in the United States if the contract had gone to Boeing will not be created. Boeing would likely create at least twice as many U.S. jobs as NG/Airbus if it ultimately wins the Air Force tanker contract.

Boeing has protested the Air Force's contract award decision, and it is currently under review by the Government Accountability Office. U.S. job losses are likely to grow in the future if the contract is awarded to EADS because it will give the company sizeable cost advantages and a leg up in future competitions to supply tankers to the Air Force, other U.S. services, and services in other countries around the world.

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The potential loss of new jobs associated with this contract has generated intense scrutiny and controversy in Congress and the media. This report provides independent and comparable estimates of the likely employment effect of the two competing contract proposals. The principal finding: *that production of the NG/Airbus KC-45 tanker would support 14,353 U.S. jobs per year, where as production of the proposed Boeing KC-767 tanker would support 28,707 U.S. jobs per year, at least twice as many as the NG/Airbus proposal.*

Background

Each of the companies competing for this contract has issued independent and sometimes conflicting estimates of employment effects. Northrop recently estimated that it would eventually create 25,000 U.S. jobs in a full-production year, and Boeing estimates that it would create 44,000 jobs (Clark and Bailey 2008). After receiving the tanker award in February, NG/Airbus recently increased its estimates of U.S. jobs gained to 48,000 (NG 2008a).³

Airbus parent EADS also claims that the Air Force contract will generate a substantial number of jobs in Europe. Wings for the tanker will be produced in Britain, in a \$3 billion contract that will reportedly support 13,000 jobs in the U.K. (Adams 2008). The Airbus 330, which will provide the airframe for the tanker, is currently manufactured in France. According to its 2006 annual review, 97.5% of all EADS employees were located in Europe (EADS 2007). Fewer than 2000 employees, or 1.7% of its total workforce, were located in the United States.

Some press reports have claimed that it has been “impossible to verify” estimates of the jobs that would be created by either company under the contract (Herszenhorn and Bailey 2008). This Briefing Paper aims to clarify the debate by providing transparent and comparable estimates of both contracts’ effect on U.S. jobs. These estimates are based on publicly available data on the estimated cost of a representative year of full production (15 aircraft per year).

Air Force officials have stated that the effect on employment was not one of the five criteria taken into consideration when awarding the contract.⁴ There are few, if any other major countries that do not take into account the location of production and employment in military

procurement decisions. The process of accounting for the promised and actual location of production under military contracts is governed in most countries under so-called “offset” arrangements. Offsets are agreements by exporting companies to locate production in the purchasing country or to source products from or transfer technology to firms in that country.⁵ The U.S. Commerce Department tracks these agreements in cases where they affect military equipment sold by U.S. firms, and it issues annual reports on offsets and their impact on U.S. production and employment (see Herrnstadt 2008 for further details).

Estimating the employment effects of the Boeing and NG/Airbus tanker proposals

Several key assumptions and variables influence the estimates on the total number of jobs supported by each contract. The first variable is the contract size. At this point in time, relatively little is known about the precise cost of the aircraft to be delivered under the contract. The Air Force has announced that the total cost of producing the first group of 64 tankers will be \$10.6 billion, or approximately \$165.6 million per aircraft (AFPN 2008b). Reports state that the two proposals were competitive on price, so it is assumed here that total costs would be the same for Boeing. These costs were expressed in current dollars over the life of the contract, so assumptions were made to convert these expenses to constant dollars (see the Appendix for a detailed explanation of the methodology used in this Briefing Paper’s calculations).

The most important variable in comparing the effect on jobs across the two firms is the level of U.S. content of each of the competing products. This analysis evaluates the employment impacts of the contract under a range of content estimates for each competitor, and identifies a most likely estimate based on published reports. Boeing claims that its products will have a much higher level of domestic content, which is consistent with aggregate production data for this sector of the U.S. economy (which averages 84%). But this Briefing Paper also provides an alternative estimate of 75% domestic content for the Boeing tanker to account for potentially higher levels of off-shoring.

Airbus initially claimed that 50% of its tanker “will come from American companies,”⁶ but it recently increased

this estimate to “at least 58%” (NG 2008a). As a result, this Briefing Paper provides estimates of the U.S. labor content for the Airbus tanker at both 50% and 60%.

The employment impacts of tanker production are estimated in this paper using an input-output model that estimates the direct and indirect labor requirements of producing output in a given domestic industry. The model includes 201 U.S. industries, 84 of which are in the manufacturing sector (see the Appendix for further methodology details).

Three types of job generation are evaluated in this study. The input-output model is used to estimate the first two types: *direct and indirect* effects of the Air Force contract on U.S. employment. Direct effects include all jobs supported in aerospace products and parts manufacturing. The indirect effects include all jobs supported in industries that provide “inputs” into aircraft production, which would include electronics (for aircraft avionics), metal production, software programming (by contract programmers not working for Boeing or Airbus), legal services, and so forth.

The third type of job generation is caused by *re-spending*. These are jobs supported by the wages earned by workers in both the aerospace sector and in all the

other sectors supported by aerospace. When those workers spend their wages, it creates demand for additional products, which in turn supports additional jobs in their local and the national economy. Re-spending impacts are estimated at the sector level using an analysis based on average wage and re-spending levels by industry (Bivens 2003). It should be noted that the re-spending multipliers used in this study are much smaller than other publicly available project-spending multipliers (such as the BEA’s Regional Input-Output Modeling System, RIMS II).

Tanker job gains for the United States

It is estimated that full production under these contracts will be achieved in 2014. The jobs supported under the Boeing and NG/Airbus proposals in that year under the most likely scenario are summarized in **Table 1**.

Table 1 assumes that in the most likely scenario, Boeing domestic content will average 84%, the average level for the domestic industry. Although outsourcing is growing in aerospace, this will likely be offset by the need to source defense-specific equipment locally. The table also assumes that NG/Airbus is most likely to achieve a 50% level of domestic sourcing, and that this content

TABLE 1

Employment impacts of Air Force KC-X tanker replacement contract

most likely base-year full-production scenario*

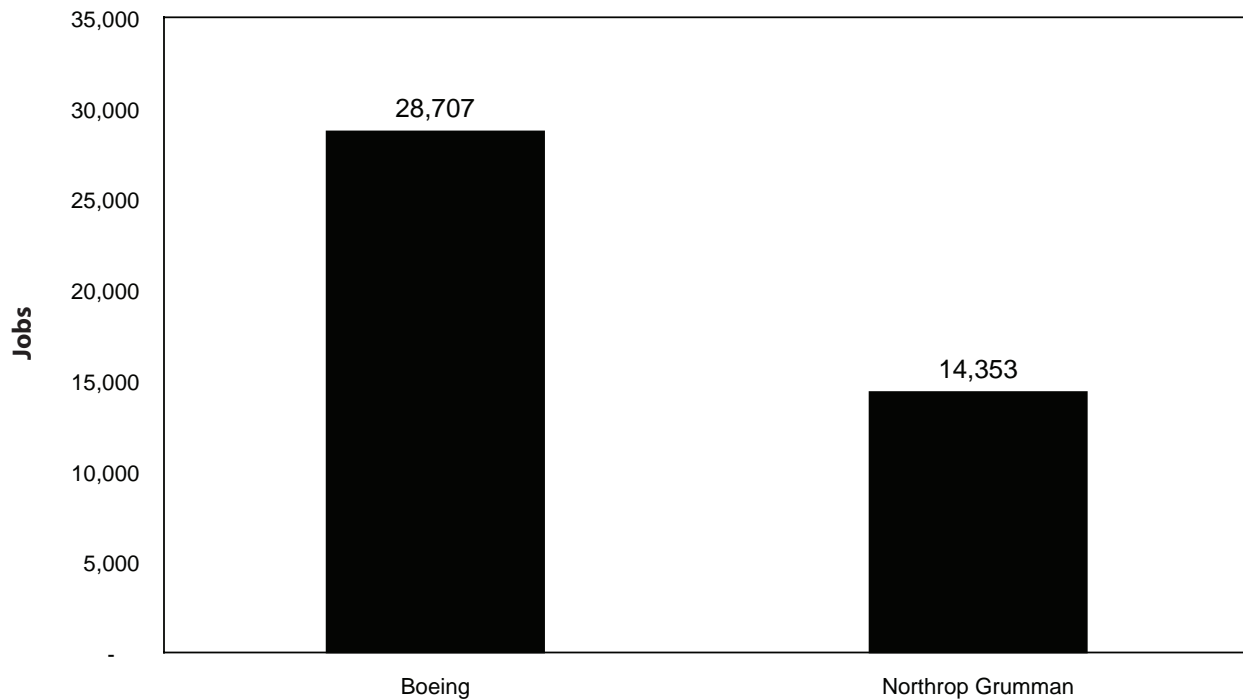
	Boeing	Northrop Grumman
Direct jobs	6,838	3,419
Indirect jobs	7,098	3,549
Respending jobs	14,770	7,385
Total employment impact	28,707	14,353

* Assumes production of 15 planes per year, \$165.6 million per plane estimated contract value, with Boeing at industry average domestic content (84%) and Airbus at 50% domestic content.

SOURCE: Author’s analysis of data from the Bureau of Economic Analysis.

FIGURE A

Boeing tanker likely to generate twice as many jobs as Northrop Grumman proposal



SOURCE: EPI analysis. See text for details.

is produced at industry average employment-to-output levels for the United States.⁷ This value is consistent with NG's early estimates of their domestic content, and with the fact that production of the primary components—such as wings, tail, and fuselage of the aircraft—will likely take place in Europe for many years to come, with only the final assembly phase taking place in the United States (likely Mobile, Alabama). This 50% level might even be an overstatement since EADS has failed to deliver on past promises to create a significant number of U.S. jobs assembling a new Light Utility Helicopter for the U.S. Army.⁸

In this scenario, the Boeing contract will support some 6,800 direct jobs and 7,100 indirect jobs. Re-spending will support an additional 14,800 jobs. Therefore, in the first year at full production the Boeing tanker would support **28,700 U.S. jobs**, as shown in Table 1. The NG/Airbus contract would support 3,400 direct jobs, 3,500 indirect jobs, and 7,400 jobs through re-spending. Thus, the NG/Airbus contract would support approximately

14,400 U.S. jobs at full production. This is approximately half of the number of jobs that would be supported by the Boeing contract, as shown in **Figure A**.

Indirect jobs supported by the tanker contract would be spread widely throughout the economy, as shown in **Table 2**. In the Boeing case, approximately 2,300 indirect jobs—slightly more than one-third of total indirect jobs—would be in manufacturing industries. Most of those would be in durable goods industries such as fabricated metal products (897 jobs), computers and electronics (570 jobs), and the metals industries (231 jobs). Most of the indirect jobs would be located in the services industries, including professional, scientific, and technical services (996 jobs), administrative support (578), wholesale trade (657), and transportation and warehousing (567).

In the NG/Airbus case, each of these figures would be 50% smaller, but the proportions would be the same. Approximately 1,200 jobs—slightly more than one-third of total indirect jobs, would be in manufacturing industries

TABLE 2

Direct and indirect employment impacts of Air Force KC-X tanker replacement contract

most likely base-year full-production scenario*

	Boeing	Northrop Grumman
Direct employment		
Aerospace product and parts manufacturing	6,838	3,419
Indirect employment		
Agriculture, forestry, fishing, and hunting	21	10
Mining	29	14
Utilities	28	14
Construction	90	45
Manufacturing	2,339	1,169
Consumer non-durables	56	28
Industrial supplies	341	170
Durable goods	1,713	971
Steel, aluminum, and other primary metal products	231	115
Fabricated metal products	897	449
Metal machinery products	111	55
Computers and electronic equipment	570	285
Electrical equipment	52	26
Motor vehicles & pts. and other transport equipment	45	22
Furniture products	14	7
Medical equipment and other misc. mfg. products	22	11
Wholesale trade	657	329
Retail trade	126	63
Transportation and warehousing	567	283
Information	181	90
Finance and insurance	261	131
Real estate and rental and leasing	111	55
Professional, scientific, and technical services	996	498
Management of companies and enterprises	382	191
Administrative and support and waste management and remediation services	578	289

(Table 2). Most of those would be in durable goods industries, such as fabricated metal products (449 jobs), computers and electronics (285 jobs), and the metals industries (115 jobs). Most of the indirect jobs would be

located in the services industries, including professional, scientific, and technical services (498 jobs), administrative support (289), wholesale trade (329), and transportation and warehousing (283).

TABLE 2 (CONT.)

Direct and indirect employment impacts of Air Force KC-X tanker replacement contract

most likely base-year full-production scenario*

	Boeing	Northrop Grumman
<i>Indirect employment (cont.)</i>		
Educational services	39	20
Health care and social assistance	4	2
Arts, entertainment, and recreation	61	31
Accommodation and food services	227	113
Other services (except public administration)	131	66
Government	270	135
Special industries	-	-
Subtotal, indirect	7,098	3,549
Responding jobs	14,770	7,385
Total employment impact	28,707	14,353

* Assumes production of 15 planes per year, \$165.6 million per plane estimated contract value, with Boeing at industry average domestic content, and Airbus at 50% domestic content.

SOURCE: Author's analysis of data from the Bureau of Economic Analysis.

Sensitivity analysis

In the jobs analysis, the most important difference between the Boeing and NG/Airbus proposals is in the level of actual domestic content. This is distinct from the share of the work going to “American companies,” as noted above. In theory, an American company with a contract from NG/Airbus could perform all of the work outside of the United States, and generate no domestic content.

In order to test the significance of the domestic content assumptions, this report examined a range of likely scenarios for each company. For Boeing, a range of 75% to 84% domestic content was assumed (as previously noted). For NG/Airbus, a range of 50% to 60% “from American companies” is assumed, based on that company’s claims.

The results of the sensitivity analysis are summarized in **Figure B**. The total labor content of the Boeing tanker

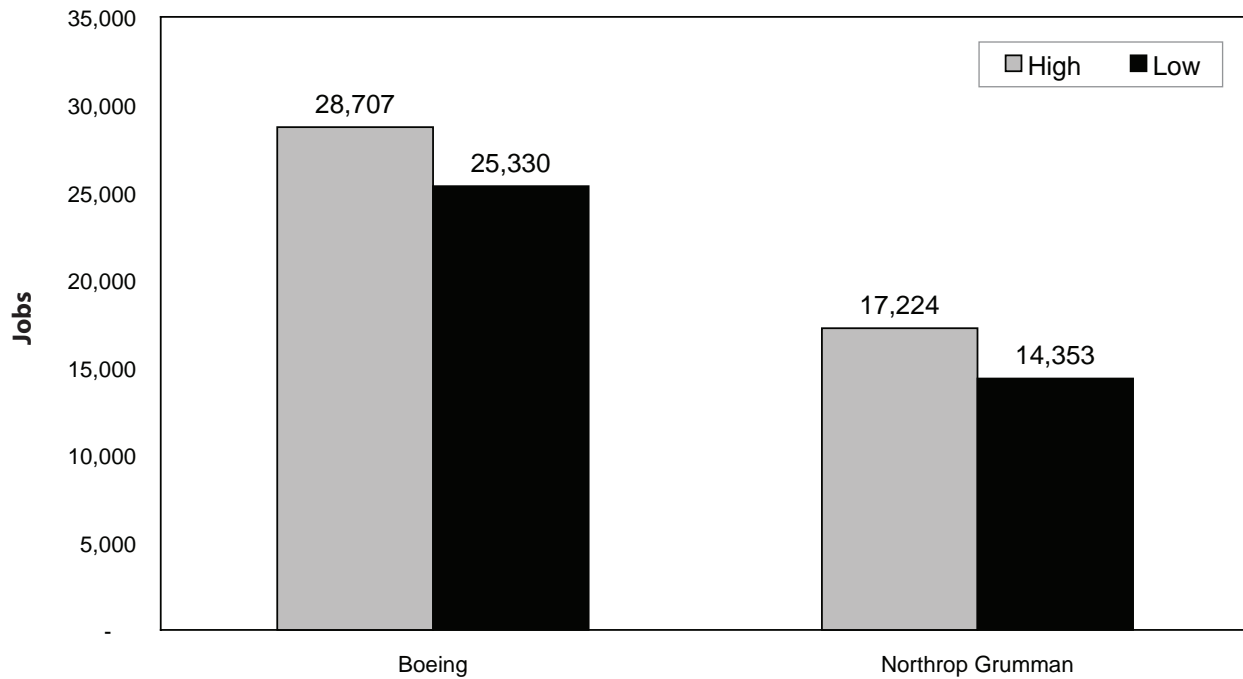
is estimated to range from 25,300 to 28,700 jobs. The NG/Airbus tanker would support 14,400 to 17,200 jobs. Detailed employment estimates for each scenario are shown in **Table 3**.

How reliable are forecasts of job gains under the NG/Airbus and Boeing tanker proposals?

This report provides transparent estimates of the employment effect of the two competing proposals on a consistent, apples-to-apples basis. Estimates of jobs gained under the competing proposals have circulated widely and are well known in this debate. It is therefore important and useful to compare and contrast those estimates with the estimates developed in this paper in order to better understand the sources of any disparities.

FIGURE B

Boeing tanker would generate more jobs than Northrop Grumman proposal in all scenarios



SOURCE: EPI analysis. See text for details.

TABLE 3

Employment impacts of Air Force KC-X tanker replacement contract, alternative content assump

Low Boeing, high Grumman domestic content estimates base-year full-production scenario*

	Boeing**		Northrop Grumman**	
	<i>domestic content:</i>		<i>domestic content:</i>	
	84%	75%	60%	50%
Direct jobs	6,838	6,034	4,103	3,419
Indirect jobs	7,098	6,263	4,259	3,549
Responding jobs	14,770	13,032	8,862	7,385
Total employment impact	28,707	25,330	17,224	14,353

* Assumes production of 15 planes per year, \$165.6 million per plane estimated contract value.

** Most likely scenarios highlighted.

SOURCE: Author's analysis of data from the Bureau of Economic Analysis.

As noted above, the re-spending multipliers used in this study are *much smaller* than other publicly available project-spending multipliers (such as the BEA's Regional Input-Output Modeling System, RIMS II). Those higher multipliers were used in some or all of the industry estimates of job creation; and hence the job estimates shown here are generally lower than those in industry reports.

Northrop Grumman/Airbus estimates

This analysis suggests that NG/Airbus's forecasts of U.S. job gains under the tanker contract are greatly exaggerated, exceeding likely estimates shown in Table 3 by at least 45% and perhaps as much as 179%, and that is even if NG/Airbus sources its work as it publicly claims it will, which is not a foregone conclusion based on past experience. For example, Airbus parent EADS has so far failed to deliver on the majority of new U.S. jobs promised under a recent contract to deliver helicopters to the U.S. Army, a failure that could raise doubts about its tanker job creation claims. EADS received a contract in June 2006 to produce 322 UH-72A "Lakota" light utility helicopters for the U.S. Army. It has claimed that this contract—with a "potential total program life cycle value" of over \$2 billion—will support "some 250 jobs" at peak production in a newly expanded factory in Columbus, Mississippi (EADS 2006 and 2008). The plant was "ramping up production to rates of three aircraft per month" (EADS 2008), and it delivered its 24th helicopter in April 2008. Despite being near peak production, it appears that fewer than 100 new U.S. jobs have been created by the contract, according to news reports.⁹

Boeing estimates

Boeing's estimates of likely employment gains under its tanker proposal appear to be more reliable than the NG/Airbus estimates. Boeing has estimated that its tanker project would support "over 44,000 U.S. jobs" in "over 40 states" (Boeing 2008). This estimate includes 13,497 direct and indirect jobs and about 30,600 "re-spending" jobs.¹⁰ Boeing's estimate of direct and indirect employment gains—13,497 jobs—is nearly identical to direct

and indirect employment estimates shown here (13,936 jobs in Table 1 above). Boeing's total employment estimate (44,000 jobs) is thus 53% to 74% larger than the estimate developed in this study (28,707 jobs from Table 3), but is substantially more accurate than the NG/Airbus estimates reviewed above.

That the Boeing estimates of the direct and indirect employment effects are nearly identical to those shown here is not surprising. This reflects the fact that the analysis in this report is based on average U.S. employment/output data from the Department of Commerce and Bureau of Labor Statistics. Since Boeing is responsible for a sizeable share of total national output of aerospace products, its internal estimates of direct and indirect labor content should (and roughly do) mirror national averages.

The Boeing model has an implied average "re-spending" multiplier of approximately 2.3, which is based on publicly available RIMS II multipliers from the U.S. Department of Commerce. The EPI model in this report uses an implied average "re-spending" multiplier of 1.06 (again, see Table 1). The re-spending multipliers used in this study are based on industry-specific, national estimates provided by Bivens (2003); the difference between the Boeing and Bivens "re-spending" multipliers explains all of the difference in jobs gained in the two estimates.

Conclusion

Based on the best available information, it appears that the Air Force selection of the Northrop Grumman KC-45 tanker proposal will likely generate at least 14,000 fewer U.S. jobs than the competing proposal from Boeing, or about half the total that would be supported by Boeing. In actuality, these figures *understate* the potential losses to U.S. employment and aerospace production. The experience gained under this contract will give the winner a leg up in future competitions for many more tanker aircraft that will be purchased by the Air Force, by other U.S. services, and by other governments in the future. No other country in the developed world would make these types of purchases without regard to levels of domestic content, domestic employment, or the competitiveness of its domestic aerospace industry. The facts speak for themselves.

Appendix: Methodology

This report estimates the direct and indirect effect of domestic spending under each tanker proposal using an input-output based employment requirements table developed by the U.S. Bureau of Labor Statistics (BLS 2008a and 2008b). This analysis was based on a detailed, industry-based study of the relationships between changes in trade flows and employment for each of 201 sectors of the U.S. economy. The model assumes that initial direct spending takes place in the aerospace products and parts manufacturing sector, North American Industry Classification System (NAICS) sector 3364. For further details of the approach used in this analysis, see Ratner (2006).¹¹

The BLS estimates two types of employment requirement tables. Standard employment requirement tables estimate the total amount of labor required to produce a given volume of output, using domestic production technology.¹² Tables adjusted to remove the employment effect of imports are known as domestic employment requirements tables. Comparing domestic and total employment requirements in a particular sector provides an estimate of the effective level of domestic content. For aerospace products and parts manufacturing, the ratio of domestic to total employment requirements in 2006 was 84%. Domestic employment requirement coefficients (adjusted to remove imports) were used to estimate all employment impacts in this study.¹³

Projected spending in 2014 was deflated to nominal 2006 dollars for these estimates. The model used was based on nominal 2006 input-output and employment require-

ments. It was assumed that inflation over the life of the contract was offset by learning curve effects. Thus, the average cost per plane is assumed to be constant in 2014 dollars over the life of the contract (for 64 planes at a total cost of \$10.6 billion). BLS price indices mapped to its input-output tables showed that inflation averaged 3.2% per year between 2001 and 2006 in aerospace products and parts (BLS 2008a). This study assumed that inflation continues at this pace until 2014. Thus, the average unit price was deflated by approximately 22% to convert projected spending to 2006 dollars.

Industry projections of employment that will be generated by the tanker contracts are reportedly based, in part, on the use of regional employment multipliers (RIMS II) from the Bureau of Economic Analysis. Those multipliers calculate both indirect employment as well as re-spending impacts. Since the input-output based multipliers used in this study generate estimates of indirect employment, RIMS-type re-spending multipliers could not be used. Re-spending jobs were estimated, instead, for each major sector in this model using results from Bivens (2003, Table 6).

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Endnotes

1. The initial Air Force contract with Northrop Grumman is for \$1.5 billion, and covers the costs of development and delivery of four test aircraft. The contract also includes five production options for 64 aircraft for \$10.6 billion. Total contractor payments for replacing 179 tankers would be \$35 billion, and additional funding for Air Force operations and support would bring the total cost of the contract to \$40 billion (Air Force Print News Today 2008a).
2. Approximately 400 new planes would be required to replace the current fleet of 535 tankers, at a total cost that could reach \$100 billion (Clark and Bailey 2008).
3. Both estimates are still available on the Northrop Grumman Web site. See NG (2008b) for estimate that KC-30 tanker would support 28,000 jobs. KC-30 was the tanker project designation prior to the contract award. The project was renamed KC-45 after the Air Force contract award was announced.
4. Statements of Assistant Secretary of the Air Force for Acquisitions Sue Payton, as reported in AFPN (2008a). The five factors considered in a “best value determination” by the Air Force in its source selection process were “mission capability, proposal risk, past performance, cost/price, and an integrated fleet air refueling assessment—performance in a simulated war scenario” (AFPN 2008b).
5. There are many different types of offset agreements. A “direct” offset is an agreement to transfer production of the product in question in exchange for the sale. For example, In June 1992, General Dynamics agreed to assemble 36 planes from kits and to completely manufacture and assemble 72 additional planes in South Korea as part of a contract for 120 F-16 fighter aircraft that were sold to that country (Barber and Scott 1995, 37-38). Thus direct offsets accounted for 90% of the planes sold in this contract. Indirect offsets and subcontracts involve production and/or trade of a product not directly related to the contract. For example, between 1993 and 2006, U.S. defense contractors engaged in indirect offsets involving \$6.4 million in textile products, \$3.8 million in apparel, and \$7.9 million in sales in “fishing, hunting, and preserves” (U.S. Department of Commerce 2007, Table 2-4, 2-11). Offset agreements can often exceed the direct value of the actual contract in question. Offsets are particularly common in the aerospace sector, and it is widely reported that commercial firms also engage in offset contracts.
6. It is important to note that components purchased from American companies are not the same thing as U.S. content. General Electric is a company based in the United States, but it also makes aircraft engines in plants in several countries. This study makes assumptions about domestic content that correct for this distinction.
7. The domestic employment content of U.S. aerospace production averages 84%. Thus, if NG sources 50% of the value of its tanker domestically, the imputed domestic content would be approximately 42% (0.5 times 0.84). This difference explains part of the gap between the mostly likely employment content of the Boeing and NG products shown in Table 1.
8. See section on “Northrop Grumman/Airbus Estimates,” p. 8.
9. See Le Coz (2006), Wallace (2006), Wireless (2007), and Cox (2008).
10. Personal Communication, Boeing Co., May 15, 2008.
11. Ratner (2006) is an Appendix to the U.S. section of Faux et al. (2006), by Scott.
12. See Documentation for Employments tables in BLS (2008b).
13. For Boeing, the high-content case assumed that 100% of the tanker was produced using U.S. technology as captured by the domestic employment requirements tables. In the low-content case, it was assumed that 88% (.75/.85) was produced domestically and that the rest was imported. For NG it was assumed that 50% and 60% of content was produced using U.S. technology.

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