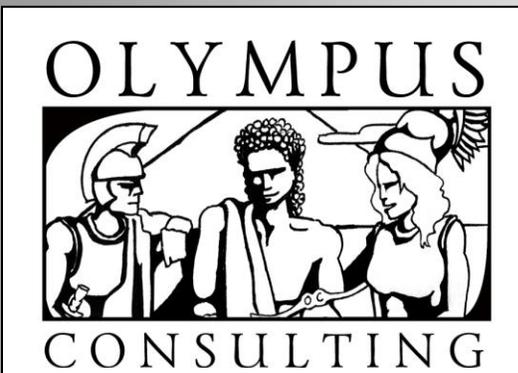


Economic Impacts of the Composite Recycling Technology Center – Present and Future



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Abstract

This report presents and summarizes the economic impacts of the Composite Recycling Technology Center in Port Angeles, Washington. Impacts are estimated in terms of employment, wages, and state and local business tax revenues from development and sale of products created from recycled advanced composite materials. Projections, based upon current and anticipated product lines, for 2017 are presented and summarized. The current workforce of 9.4 FTEs earns an average monthly wage of \$6,664, and supports an additional 4.6 FTEs in the supply chain at an average monthly wage of \$6,261. Expenditures from this employment support an additional 6.4 FTEs in the local economy at an average monthly wage of \$4,294. These activities generated \$31,144 in state and local taxes with nearly \$12,000 retained locally in 2016.

OVERVIEW: BACKGROUND AND COMPELLING NEED

The Composite Recycling Technology Center (CRTC) located in Port Angeles, Washington, was created to bring together infrastructure and technical expertise to transform “pre-preg” advanced composite waste materials into recycled feedstock to produce commercially viable products. The physical proximity of CRTC to a diverse advanced composites sector located at the Composites Manufacturing Campus, and Peninsula College’s well-established workforce training programs in advanced composites, can create synergies to foster economic growth in a distressed region.

The need for deliberate and proactive cooperative economic development policy in Clallam County is compelling. Economic well-being continues to lag behind Washington State as a whole, and the I-5 corridor (Bellevue/Seattle/Everett) in particular. In December 2016 the unemployment rate in Washington was 5.2% and 3.7% in the Bellevue/Seattle/Everett region; in Clallam County, it was 8.1%, 56% greater than the state-wide average, and nearly three times greater than the “distressed county” threshold.¹ Similar disparities are seen in family income. For Washington, in 2016, the mean family income was \$56,650 and \$61,000 in the Bellevue/Seattle/Everett region; in Clallam County, \$36,612, with hourly wages of \$27.24, \$29.33 and \$17.60 respectively.² Thus, it is no surprise that Clallam County has a poverty rate of 15.6% while the state average is 12.2%.³

CONCEPTUALIZING AN EMERGENT SECTOR IN THE ADVANCED COMPOSITES INDUSTRY

Since inception, CRTC has been envisioned as the nexus for prepreg waste composite materials, development of methods to recycle those materials as feedstock for new and innovative products, creation of retail outlets for those products, and spinoff of market proven products to the private sector for manufacture. This would be followed by another round of product development and spinoff, and all using recycled materials currently directed to landfill. Similarly, the availability of low cost recycled prepreg materials, the technological expertise of CRTC engineers and technicians, and the presence of a certified advanced composite materials workforce will afford cost advantages for manufacturers making locational decisions for facilities. Thus, CRTC is uniquely poised to create sustained synergies for economic development, and bring family wage jobs to local families.

Figure 1 illustrates CRTC as the nexus of synergies for economic development. The overall design goal for CRTC operations is to redirect prepreg composite materials from landfill to the marketplace; thereby capturing the net energy investment to manufacture composites otherwise lost as waste and transforming it into innovative products. We see this as the dotted arrows, reducing landfill by redirecting the flow to CRTC at a low cost. At present, CRTC is pursuing several directions in research

¹ <https://fortress.wa.gov/esd/employmentdata/reports-publications/economic-reports/monthly-employment-report/map-of-county-unemployment-rates>; <https://fortress.wa.gov/esd/employmentdata/docs/economic-reports/current-monthly-employment-report>

² <https://esd.wa.gov/labormarketinfo/county-profiles/clallam>;
https://www.bls.gov/oes/current/oes_42644.htm#00-0000

³ <http://www.census.gov/quickfacts/table/IPE120215/53>;
<https://www.census.gov/quickfacts/table/PST045215/53009/embed>;

and development. First is developing products that can be constructed from these materials, a process that utilizes innovative methods of cutting, laminating and curing advanced composites. Second is developing methods to reconstitute waste materials into larger pieces, and reconfigure composite weaves to meet different structural demands. The third direction, much like the first two, will focus on the use of recycled cured materials. Figure 1 also illustrates the unique partnership developed with Peninsula College’s Advanced Composites Program. Students work towards certification building products designed by CRTC, thus developing a knowledge skill set that can be directly used to manufacture recycled material products, and which can be quickly adapted to the manufacture of other advanced composite projects. The two-way arrow emphasizes that students learn and, at the same time, are prepared to work as advanced composite technicians at CRTC.

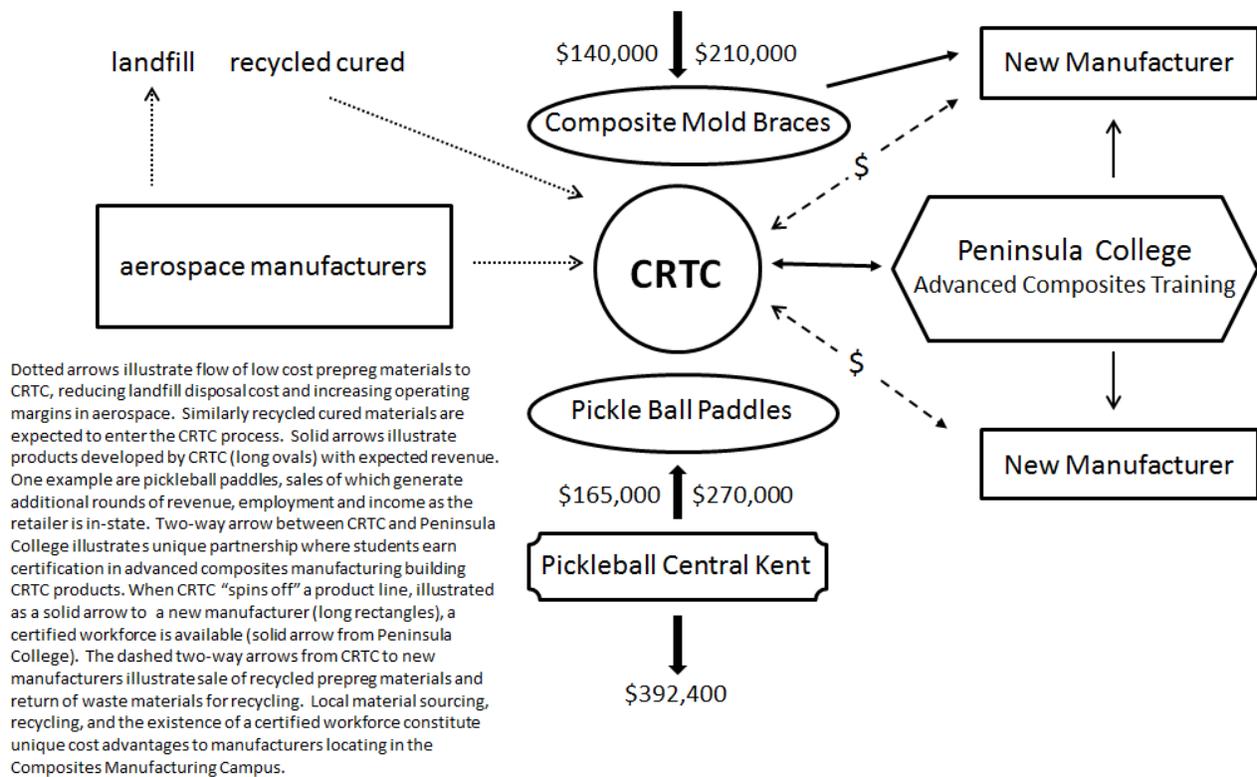


Figure 1. Composite Recycling Technology Center: The Nexus of Synergies for Sustainable Community Economic Development.

While CRTC has several product lines under development, two are presented in the illustration. Pickleball paddles have been released for retail sale through an agreement with Pickleball Central of Kent, Washington.⁴ Expected revenues to CRTC are presented, as well as final retail sales to Pickleball Central at their MSRP of \$109. The solid inward arrow illustrates expected CRTC revenues for 2017: the outward arrow sales to Pickleball Central. This example illustrates the synergies CRTC is developing within Washington State. By contracting with in-state distributors, additional rounds of revenue, employment and income are created, thereby increasing the total economic impacts from CRTC

⁴ <http://www.pickleballcentral.com/Default.asp?gclid=COiszLeI9NECFQ9EfgodLxQK4g>

operations. In the case of pickleball paddles, an additional 4.1 in-state FTEs are supported. These impacts can increase again as the manufacturing process goes to the private sector. It is likely the new manufacturer will locate near CRTC to utilize the source flow of materials and minimize transport costs, have a low cost depository for their waste materials, make use of CRTC technical expertise, and make use of the local certified workforce. Similarly, other entrants to the recycled advanced composites industry will have the same incentives to locate in the Composite Manufacturing Campus. A second product line is composite mold braces, ready soon for market. Sustained community economic development should be the outcome.⁵

ECONOMICS IMPACTS OF CRTC

IMPLAN was used to conduct economic impact analysis for 2016 with projections through 2017.⁶ IMPLAN regional input-output models use estimated expenditure flows across sectors to compute indirect effects (employment and income) in the supply chain, and induced effects (employment and income) as those directly and indirectly employed make expenditures in the local economy. State and local business taxes include sales taxes, property taxes, and “other” tax categories related to production and expenditures. CRTC provided economic data to conduct the analysis, including wages by job classification, expenditures, capital investments, and current and projected sales revenue.

Economic Impacts 2016

Groundbreaking for CRTC was celebrated on September 22, 2015. The construction phase was funded primarily by grants from the Economic Development Agency, the Clean Energy Fund, the Clallam County Opportunity Fund, and the Port of Port Angeles totaling \$4.5 million.⁷ While operations commenced August 1, the ribbon cutting was on September 21, 2016. Over \$1 million in funding for the start-up phase came from the Clean Energy Fund 2 and the Port of Port Angeles. The Clean Energy Fund 2 financed capital investments of \$331,230 in October and \$313,920 in November. The Economic Development Agency I6 and Clean Energy Fund 2 will finance capital investments of \$670,053 in 2017.⁸ CRTC has established relationships with entities in the composites industry to fund research toward development of specific products. The start-up involved acquisition and installation of equipment, transport and storage of prepreg waste materials, and research and development of recycling technologies and product development. On December 2, 2016 CRTC announced its first product and retail distributor, a pickleball paddle to be distributed by Pickleball Central in Kent, Washington.

Table 1 illustrates direct, indirect and induced economic impacts of CRTC’s operations for 2016. Direct effects capture employment and wages of CRTC employees, including contract operations. Indirect

⁵ CRTC as the potential nexus for synergies in economics is detailed in Geoffrey M. Wood, 2016 *State of the Carbon Fiber Composites Industry*, Port of Port Angeles, 2016.

⁶ Use of IMPLAN in analyzing advanced composites is problematic as the models used are for a range of existing products, not innovative products made from low cost recycled waste materials. IMPLAN sector 274, carbon and graphite products, was used in this report, and may understate or overstate the aggregate intersectoral linkages for advanced composites. The Washington 2012 database was used. All values in \$2016.

⁷ Economic impacts for construction and equipment can be found in *Economic Impacts of the Composite Recycling Technology Center – A Brief Technical Report*. Port of Port Angeles, March 21, 2015.

⁸ Whenever possible, equipment is purchased in-state to maximize economic expenditure multipliers. At present, this is about 25 percent of capital investment.

effects measure employment and wages in the supply chain through which CRTC obtains and transports materials. Induced effects result when those directly and indirectly employed spend their income.⁹ Total income was annualized over the months of operation in 2016, and used to estimate average monthly wages by effect – direct, indirect and induced. The living wage premium (LWP) is the difference between an average monthly wage and \$3,987, the living monthly wage for a family of 4 with one working adult.¹⁰ During the start-up phase, the average monthly wage was \$7,651 with a LWP of \$3,664. This wage is biased upward by the cost of engineering staff – critical to the mission of CRTC – and not executive compensation.¹¹ The table also reveals that both indirect and induced employment, on average, provide LWPs of \$2,274 and \$307, respectively. This suggests and is verified by examining detailed sectoral analysis, that the supply chain – indirect effects – supports employment in high value sectors (wholesaling, business services). Induced effects, on average, also provide a LWP, though there is a wide dispersion in average wages by sector, from food services with a negative LWP of \$1,024 to offices of physicians, with a positive LWP of \$3,264.¹²

Scenario	Effect	FTE	Annual Income	Monthly Wage	LWP	State & Local Taxes
2016	Direct	9.4	\$863,057	\$7,651	\$3,664	\$6,703
	Indirect	4.6	\$345,592	\$6,261	\$2,274	\$10,672
	Induced	6.4	\$329,800	\$4,294	\$307	\$13,769
	Total	20.4	\$1,538,449	\$6,285	\$2,298	\$31,144¹³
2017 Level 1	Direct	10.1	\$808,537	\$6,671	\$2,684	\$32,579
	Indirect	5.8	\$436,104	\$6,266	\$2,279	\$49,962
	Induced	6.6	\$339,602	\$4,288	\$301	\$51,554
	Total	22.4	\$1,584,243	\$5,894	\$1,907	\$134,095
2017 Level 3	Direct	10.4	\$924,685	\$7,409	\$3,422	\$32,840
	Indirect	5.8	\$436,104	\$6,266	\$2,279	\$49,962
	Induced	7.2	\$371,303	\$4,297	\$310	\$56,368
	Total	23.3	\$1,732,092	\$6,195	\$2,208	\$139,170

Table 1: Economics Impacts of CRTC for 2016 with Projections for 2017.

⁹ Expenditures flows for the state-wide carbon sector were used to allow comparison with previous analysis of CRTC for the Port of Port Angeles. Thus, an unknown bias in estimates for indirect and induced effects may exist.

¹⁰ The living wage in Clallam, for a family of four with one working adult is \$47,840 annually or \$3,987 monthly. <http://livingwage.mit.edu/counties/53009> The average annual wage is \$36,608 for a monthly average of \$3,051 and a negative LWP of \$936. The LWP makes possible direct comparison of employment across occupations to determine the relative extent employment improves economic welfare. See Daniel A. Underwood, Donald Hackney and Dan Friesner, “Criteria for Sustainable Community Economic Development: Integrating Diversity and Solidarity into the Planning Process, *Journal of Economic Issues* (December 2015): 1112-1123.

¹¹ Existing compensation to executive officers is significantly below the values used in preliminary analysis during the conceptualization phase of CRTC.

¹² Even in the sector of health services, which includes offices of physicians, there is wide dispersion in wages, with few high wage jobs relative to many at low wages, the former pulling up the mean. Research indicates that while health services, on average, pays a wage slightly greater than the county average, it is below a living wage. Dan Axelsen and Daniel Underwood, *The Economic Impact of the Economic Development Council’s Economic Development Plan on Clallam County*. Clallam Economic Development Council, June 2005.

¹³ Quarterly estimated derived from annual projections.

State and local taxes are estimated for the period of operation in 2016. About 90 percent of state and local taxes are derived from sales and property taxes, of which approximately 37 percent are retained by local government. Thus, of the \$31,144 in state and local taxes generated, nearly \$12,000 help finance local government services in 2016.

Projected Economic Impacts for 2017

CRTC has developed four production scenarios with associated revenue flows for 2017, based upon a variety of product lines with associated unit production, sales prices, and profit margins.¹⁴ The assumptions shaping the Level 1 scenario are conservative so that the probability attached to those outcomes is “near certain.” Level 3 is also used in this report. While also conservative, is “less certain,” but “reasonably likely.”¹⁵ As a result, there is little difference in the economic impacts. The primary difference is in the revenue flows to be generated with a corresponding impact on direct wages. This increase in direct wages would be the outcome of a unique incentive program employed by CRTC. To create team synergies, when baseline (Level 1) product and revenue thresholds are exceeded, *all employees earn a bonus*. Thus, intrafirm cooperation is the norm at CRTC, another innovation in a firm committed to that process.

Scenarios for Level 1 and Level 3 have near equal direct employment at 10.1 and 10.4 FTEs. Wage differences are due primarily to the incentive program, with respective values of \$6,671 and \$7,409, and LWPs of \$2,684 and \$3,422. Increased production does not increase employment in the supply chain, though the increased employment and increased wages in Level 3 over Level 1 have positive impacts on induced employment. Local tax revenues (37 percent of the total) range from \$49,616 to \$51,493. Employment may rise to 12 FTEs by year’s end in non-engineering occupations. These positions can be filled by local residents obtaining certification at Peninsula College.

CONCLUSION

CRTC is moving forward as a self-sustaining operation. Success in this regard is the result of three major accomplishments. First is organization: CRTC has a focused, cooperative and talented team that shares the organization’s goals. The incentive system helps ensure this. Second, they are pursuing multiple pathways for research and development, from recycling prepreg materials to development of specific products for partners in the advanced composites industry. Third, they have identified multiple product lines with a high likelihood of success, with the first now in the market place.

Two years ago, in the inception phase, CRTC was forecast to have an initial workforce of 6.5 FTEs at an annual monthly wage of approximately \$6,700, forecast to grow to 14.75 in the second year. Less than 6 months into its operations, CRTC has a workforce of 9.9 forecast to increase to 10.1 or 10.4 by mid-2017 at an average monthly wage of \$6,671 to \$7,409. CRTC is meeting its targets and, in the process, creating synergies for economic development that bring family wage jobs to local families.

¹⁴This data is proprietary – specific products, partners, costs, margins, etc. – and do not appear in this report, even though the information was used in framing the assessments presented.

¹⁵ Bob Larsen, CEO of CRTC, uses a conservative approach in analyzing possibilities, avoiding risk to maximize the likelihood of CRTC success to become a near and long term sustainable enterprise.