

Renewable energy offers outstanding rural development opportunities for communities across America. Indian Country combines some of the Nation's most bountiful solar, wind, ocean, and forest resources, with extraordinary economic development needs, unique natural resource management goals, and a priority for preserving and enhancing cultural resources and tribal sovereignty for future generations. Trainees from the University of Washington's "Bioresource-based energy for sustainable societies" IGERT have become visible research partners with Northwest Native American Tribes, and are working to facilitate partnerships among universities and tribes across the Nation.

Trainee research with the Confederated Tribes and Bands of the Yakama Nation and the Confederated Salish and Kootenai Tribes (CSKT) established the biomass supply and costs from conventional sources, such as timber slash, as well as sources generated from the ecological removal of excess forest fuels. Because each community has distinct resource management objectives and built infrastructure, what they do with the resources and how it is integrated with other activities is distinct. For the Yakama Nation, cohort 1 showed that a combined heat and power (CHP) facility fueled by woody residues was feasible when assessed from economic, ecologic, and technologic perspectives. Moreover, the biomass market created by a CHP facility could fund much of the Tribe's invasive tree eradication program. In contrast, the CSKT have no economically viable, low technical risk options like CHP for using forestry residues.

Trainees in cohort 2 focused on the economics of emerging methods for converting biomass into higher value products. Mobile and centralized pyrolysis processing, torrefaction, and gasification were assessed to determine the viability of these emerging methods for using forest residues. The trainees found that capital investment costs for any of the high-tech conversion processes hurt economic viability for biomass utilization on the Flathead reservation.

Cohort 3 concluded that the techno-economic hurdles faced by the rural communities like the CSKT can only be overcome by innovative and appropriate new technologies with low capital investment requirements and modest specialized operator training requirements. The cohort has developed a pyrolysis blanket system that is a low capital investment method for slow pyrolysis that produces biochar. The patent pending pyrolysis technology is appropriate for use by existing fire crews, and produces a valuable soil amendment that sequesters carbon and is worth up to \$500/ton in some markets. Five members of cohort 3 have founded C6 Systems to commercialize this innovation (www.C6Systems.net, under construction). The founding members of C6 Systems have over 2 decades of forestry experience, including tribal forestry (2 co-founders are enrolled Yakama, 1 is enrolled Umatilla). C6 Systems competed in the University of Washington Environmental Innovation Challenge and won the Starbucks Award (\$2500) and have made it through two rounds of judging for the UW Business Plan Competition. As one of the 16 teams going into the semi-finals (out of 108 teams that started the competition), C6 Systems is competing for more than \$25,000 of investment in their idea for turning "slash piles into cash piles". The unique partnership model used at the University of Washington is enhancing the relevance of Ph.D. bioenergy research to indigenous communities.