

## Key Considerations for a Successful Community Oilseed Project for Food, Fuel and Feed

Nebraska Screw Press has been a strong believer in the opportunity to successfully develop community scale oilseed processing facilities to supply cost effective feedstocks to the biofuel industry. There are a number of strengths that are found in well designed and resilient community plants and if these had to be summarized in a word, it would be FLEXIBILITY. To be sustainable through market swings and instability, decentralized facilities can be designed to incorporate a myriad of processing and marketing options that span the entire range of the value added processing they operate in. Because of these market fluctuations and policy gaps, plants that want to stay in this industry long term will need to utilize a diverse set of biomass and energy inputs that can supply vegetable oil based products to numerous markets including human food, animal feed and renewable diesel markets.

We would loosely define a ‘community’ scale oilseed expelling facility as one that could process up to about 100 ton/day (TPD) of prepared biomass. While facilities larger than this can still leverage decentralized advantages and be considered ‘community’ scale, they must be carefully tailored to the available resource and markets to ensure sustainability in the hard times as well as the good.

Another defining aspect of a community based facility is also a large benefit and that is the opportunity for **local ownership and investment**. I am sure everyone is aware of the fact that the one who owns the plant, the wind turbine, the solar panels or whatever the renewable energy device is, is the one that ultimately benefits the most. In the case of local ownership, the community model would ideally include ownership by local feedstock growers, animal feed consumers, fuel consumers and others who can benefit from being owners in the business and be directly involved. Local ownership makes a huge difference when we look at the economic development footprint of a comparable facility that would have corporate and/or distant ownership. The latter usually tends to bring in their own staff and use their own suppliers and contractors. I can sure testify that in Nebraska and in the Midwest of the US in general, economic development built around a decentralized sustainable Biofuels industry in rural areas where biomass energy abounds and jobs are scarce would be a tremendous benefit.

Since I had mentioned that **flexibility** was a paramount feature of the successful community based plant, let us look closer at that aspect. This ‘flexibility’ I am describing should be integrated throughout the process from types of biomass that can be processed to the markets that the value added materials will be sold to. In today’s unpredictable and volatile market place can turn today’s profitable enterprise into tomorrow’s foreclosure and bankruptcy unless the facility has both the knowledge base and infrastructure to allow to quickly shift markets to one that would provide better returns for the materials. Typically, in a market shift, where one item loses profitability, another would appear if the facility can shift operations to meet the new market requirements. For

example, one day the value of vegetable oil sold into the biofuel market drops, while this would be a disaster for a large monolithic facility designed to only make one product, but the agile and shrewd decentralized facility can shift processing steps around and access the other markets that would still be available if this oil could be refined and sold into food markets or converted into biodiesel directly or if a cheaper feedstock could be accommodated into the raw materials. Having the ability to directly access a variety of biomass resources on the inputs and having products that can be sold into a variety of markets is the best insurance one can take out to ensure your facility keeps on running through periods of market and policy volatility.

Being able to process the full spectrum of oil bearing biomass available in your area is as simple as including these considerations in the design of the seed pre-treatment section of your facility and installing the right equipment for the biomass most likely to be encountered in your area.

It is here that the feedstock preparation and extraction technology selected for the facility can play a role. Generally speaking mechanical crushing of oil bearing seed is the only cost effective method of operating in the capacity range we are considering. Chemical extraction on a small scale is not cost effective and gas extraction methods are only showing viability for high value materials at very small scales. Many variables must be considered when considering equipment to perform the critical steps of the process including cost, manpower, ease of flexibility, variability, efficiency, expandability and maintenance. In some regions labor is not a big issue, in others it is. These variables must be considered in the context of the specific example being studied.

Within mechanical expelling technologies available, there are a myriad of choices but the most common type are the machines with larger sectional, horizontal screws of varying pitch surrounded by cage bars separated by spacers of a selected thickness to allow oil release when the oil bearing biomass is put under pressure in the cage. Chinese types are unique and not considered here as they are best suited for individual producers.

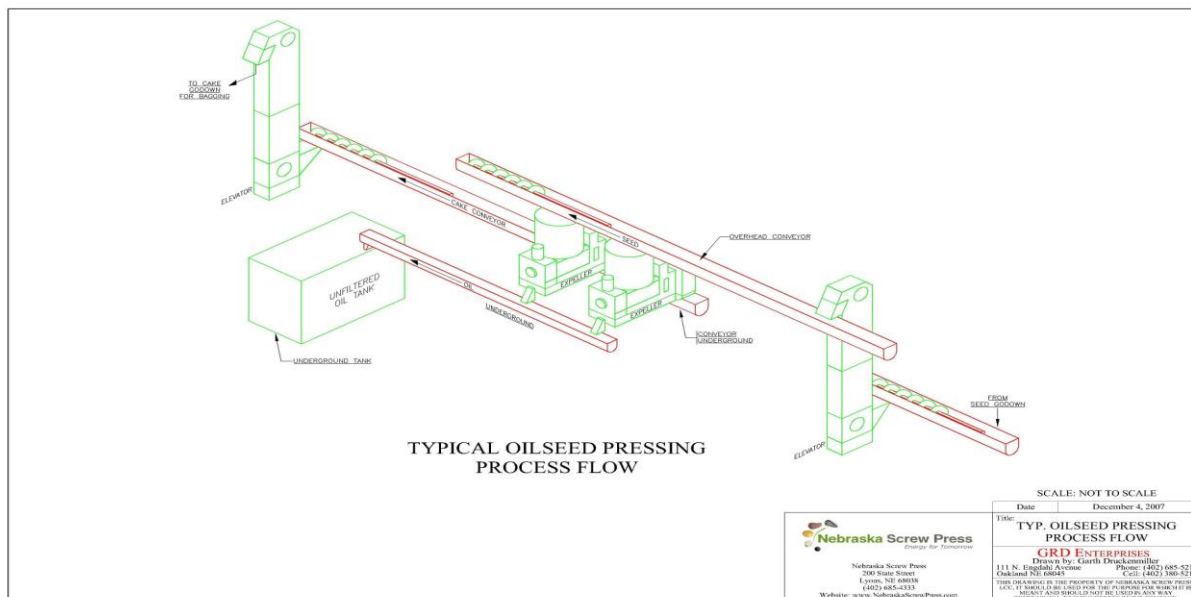


Fig 1: Typical oilseed crushing arrangement using sectional screws and horizontal cage bars



Figure 2: Typical Horizontal bar and sectional screw machines with components by Goyum

Although the horizontal bar machines as invented and patented by Valerius Anderson in 1901 still dominate this industry, smaller, solid shaft machines can offer distinct advantages over these units. These solid shaft machines do not require the expertise and experienced operators to operate efficiently like the horizontal bar machines do. In fact, these solid shaft machines are meant to operate without any supervision and boast much greater efficiencies. Solid shaft machines, best exemplified by the Komet machine produced by IBG-Montforts, cost more per ton of rated capacity but are often the most cost effective units when all things are considered, as they should be to properly develop the agile and sustainable plant meant to adjust to instability in the markets.



Figure 3: Solid Shaft machines can be engineered into groups like these

Nebraska Screw Press has often noted the importance of this step in eliminating the question of ‘what came first the chicken or the egg’? Or in our case, the agricultural producer will not grow a potentially risky new crop unless he knows for sure there will be a local outlet for his seed and the seed processor is loathe to invest in a processing facility until he knows that the seed he needs will be planted. A community facility can directly address these issues and answer the question with ‘they were both created at the same time’!

Locally owned facilities are generally better capitalized and have less debt and interest on loans to keep the facility at risk. If lenders cannot be paid because of an unforeseen shift in your markets, the facility that you worked very hard on will end up at auction for pennies on the dollar. We saw this play out between two facilities that were started in Nebraska in 2008. The smaller, locally owned facility was much better able to survive the market conditions of 2008 than the larger, corporate facility. Today, the large, inflexible facility sits idle after being sold off at auction and the smaller plant simply reorganized and is operating today using a different feedstock and serving a different market than what they had originally set out for, but their leadership, infrastructure and storage flexibility has kept them in the game.

With the ever increasing cost of transportation, the community facility will be far less impacted than the large facilities that not only depend on large areas for their feedstocks, but are often dependent on distant markets with the resulting increase in costs for shipping. This factor will play a much larger role in the future and favor decentralized production that uses local materials to serve local markets.

Community scale facilities can also benefit in other areas such as:

- Utilize abandoned, under-utilized or otherwise debilitated agricultural processing facilities to house their oilseed processing facilities, utilizing existing infrastructure and zoning while driving economic development in rural areas.
- Community scale oilseed processing facilities will promote development of specialty, organic and high value crops in rural areas. Flexible types of processing capabilities that accept a variety of seeds generally do not exist for people to take high value materials to for processing.
- These facilities would have the opportunity to add further value to the processed oil through conversion to fuel or food grade oil through refining processes. The oilseed facility is also an excellent location to integrate algal oil production that utilizes waste streams from the plant
- In Nebraska, The production of oil through facilities such as this would support the decentralized production of renewable energy. Only a small fraction of the oilseeds grown in Nebraska is processed by such crushing facilities and we import 100% of our liquid fuels.
- Because of commodity vegetable oil values and even higher values for specialty and organic oils, crush margins are volatile and diversifying market opportunities will be a key to future success. When properly established, these facilities could grow rapidly in any region where biomass feedstocks are available.

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