# Special Use Permit (SUP) Application

Village of Ellsworth, WI

July 7, 2023

### Applicant

Ellsworth Bioenergy (EB)

Bigadan

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## Table of Contents

I.	Executive Summary	2
	Proposed Project.	. 3
II.	Proposed Operations	5
	Anticipated Biomass list and Truck Requirements.	. 5
	Odor	. 5
	Traffic	. 6
	Water and Wastewater	. 6
	Attachment Lists	. 7
III.	Attachments	8
	Attachment A - Site Plan	. 8
	Attachment B – SUP Application	11
	Attachment C – Photo Log of Proposed Site	12
	Attachment D – Building & Stack Heights	14
	Attachment E – Local & WI DNR Approval Requirements	15
	Attachment F Ellsworth Community Odor Plan	17
	Attachment G Odor Treatment Plan for Bigadan's Biogas plant of Kliplev in the City of Aabenraa, Denmark.	, 19
	Attachment H Proposed Conditions to Special Use Permit	26
	Attachment I Traffic Patterns	28

### Executive Summary

Bigadan, a Danish renewable natural gas company, is proposing to develop an anaerobic digester and nutrient recovery facility in Ellsworth, Wisconsin under the name "Ellsworth Bioenergy" (further EB). Bigadan proposes to deliver the project as a Design, Build, Own, Operate and Finance to the site. The Project will occupy approximately 20-25 acres located next to other industries. The proposed facility would use anaerobic digestion (without air) to produce renewable natural gas, also referred to as biomethane, from turkey litter and dairy waste, and cheese processing byproducts, as well as similar products. The renewable natural gas would be injected into the existing natural gas pipeline system. The odor containing anaerobic digester process results in nutrient-rich byproducts that would be recovered after digestion to produce three post digestion products: digestate directly from the anaerobic digester, nutrient water high in nutrients that are readily available for a growing crop, and a high-solids product rich in phosphorus and potassium.

Currently this process is being used at Ellsworth Cooperative Creamery's Menomonie location to process dairy waste, which in turn creates a gas that is flared. This process eliminates odor unlike the current aerobic process operated by the Creamery in Ellsworth. The Ellsworth Cooperative Creamery is very supportive of this proven technology.

EB is requesting a rezoning as described in Section ZONING 46.03(h) – Agricultural District (A) to Industrial (I) in the Municipal Code of the Village of Ellsworth.

### **Proposed Project.**

The proposed project site is described below.

- 1. Abbreviated Legal Description
  - a. Parcel Number 121011520500 Acres 40 Section 20 Township 26 Range 17
- 2. Subject Site Address:
  - a. ELLSWORTH COOPERATIVE CREAMERY 109 S WALLACE ST ELLSWORTH, WI 54011

- 3. Zoning district within which the subject site is located: The EB site is currently zoned as Agricultural District(A) 46.03(h with a rezoning request to Industrial (I)
- 4. Abutting property owners of record within 300 feet:

(1) WESTERN WISCONSIN AG SUPPLY LLC a. 411 E BUSINESS WAY b. 652 E BIO AVE

- (2) WEST CENTRAL WISCONSIN BIOSOLIDS FACILITY COMM a. 677 BIO AVE
- (3) Greater than 300 ft: a. MARK & SHERYL CHRISTOPHERSON i. 116 HALLS HILL ST
  - b. DONALD J MURPHY IRREVOCABLE FAMILY TRUST i. 370 MEADOW VALLEY TR HUDSON, WI 54016
  - c. LARRY R & KARI J LANGER i. 425 E PLEASANT AVE

### Proposed Operations

The proposed use of the site is the production of renewable natural gas from locally sourced agricultural and food waste using anaerobic digestion.

### **Proposed Operation of Site**

- 1. Continuous monitoring and operations 24 hours, 7 days a week
- Deliveries occurring primarily Monday Friday: 6 am to 6 pm; Saturday: 8 am – 2 pm
- 3. 8-10 employees

### Anticipated Biomass list and Truck Requirements.

Delivery of biomass to the site and transport of digestate and fiber away from the site will account for approximately 160 transport trucks per full working day and approximately 80 on Saturdays. No transport truck operation will occur on Sundays.

Biomass will contain various sources including slurry (dairy cattle), deep litter turkeys, cheese processing waste from Ellsworth Creamery, DAF sludge from turkey processing and similar products

### Odor.

Although the raw materials are known to have odor, EB manages these materials indoors and the collected air is treated by the following means:

Odor from receiving biomass will be minimized by delivering the material into an enclosed loading hall. Buildings with odorous air, such as the loading hall, will be ventilated to keep a small under pressure inside and polluted air will be extracted at the highest points in the buildings. Collected air will be treated with a biological biofilter treatment system or by an UV and active carbon treatment system, The final design of the air treatment system depends on the Odor Management Plan.

Tanks that store the anaerobic digestion byproducts will be ventilated to maintain a small under pressure inside the tanks. The air from the tanks will be treated in a pre-filter before entering the main biological treatment filter, where it will be blended with air extracted from the odorous buildings. This pre-filter will treat ammonia and hydrogen sulfide (H<sub>2</sub>S) removal.

Treated air from the biological treatment system will be lifted into a stack to aid dispersion as it is released to the environment. Reference Attachment D for both the building and the proposed stack heights.

The project is not anticipated to generate any odors during construction.

### Traffic.

Locally sourced biomass inputs for the anaerobic digesters will be delivered to EB on tank trucks. EB anticipates that trucks delivering liquid biomasses (dairy slurry, cheese waste and dissolved air flotation solids) to the site would also take digestate or nutrient water away from the facility. Cheese waste from the Ellsworth Cheese plant will be pumped to the EB facility. EB estimates that at full production of the facility there will be approximately 150 transport trucks per full working day and approximately 80 on Saturdays. Transport trucks will not be in operation on Sundays.

EB will work to optimize the truck traffic patterns throughout the design phase to prevent off-site transport truck queueing that may present local traffic issues

### Water and Wastewater.

The operation of EB would require approximately 8 million gallons per year (25-75 gpm) of water to support the entire digestion process and other water. Water used in plant operations would be sent to the anaerobic

digesters to become product. Any water that comes into contact with raw materials would be captured and used in the anaerobic digesters. Wash stations for rinsing delivery trucks would be located within the enclosed manure and dry material receiving areas. This wash water would be collected and used as liquid raw material for the anaerobic digesters.

EB would send sanitary wastewater to the local wastewater treatment system. The wastewater would be domestic strength concentrations. It is anticipated that sanitary flow for the proposed facility will be approximately 180,000 gallons per year, or less than 500 gallons per day, including shower facilities (Based on approximately 10 employee).

### Attachment Lists.

Attachment A – Location Map / Site Plan/ Proposed Stormwater Ponding Attachment B – SUP Application Attachment C – Photo Log of the Proposed Site Attachment D –Building and Stack Heights Attachment E – Local & WI DNR Approval Requirements Attachment F – Ellsworth Community Odor Plan Attachment G - Odor Treatment Plan for Bigadan's Biogas plant of Kliplev, Aabenraa, Denmark. Attachment H – Proposed Conditions to Special Use Permit Attachment I – Traffic Patterns

### Attachments.

### Attachment A - Site Plan







### Attachment B – SUP Application

VILLAGE OF ELLSWORTH Revised 1/1/2018 PLAN COMMISSION REVIEW APPLICATION ETZ REVIEW APPLICATION BOARD OF APPEALS REVIEW APPLICATION

Applicant's Name:	Telephone No.							
		Fax No						
Address:								
Property Owner:		Telephone No.						
		Fax No.						
Address:								
Request for:								
Zoning District Change (\$425) Plan Com			ssion (\$375)					
Special Use Permit (\$75)		Board of Appeals (\$375)						
Conditional Use Permit (\$75) Other								
Certified Survey Map Approval	(\$375)							
ETZ Joint Meeting (Village Of Ellsworth/Township) (\$425)								
Area:		_						
Village Of Ellsworth		Tow	n of Ellsworth					
Town of Trimbelle								
Status of Applicant:								
Owner Agent		Buyer	Other					
Present Zoning:	Present Zoning: Zoning Requested:							
Uses Proposed:	A	Acreage(s):						
Location:								
Legal Description:								
(Attach legal if needed)								
The undersigned applicant or repre	sentative, t	hereof, certific	es that he/she is familiar with					
the State and local code applicable	to this requ	est, the proce	dural requirements of the					
Village and/or Township, and all o	ther applica	ation Village o	ordinances.					
Signature of Applicant/Representa	tive:		_					
(print)			Date					
(			Dete					
(signature)			Date					
Application received by:			Date					
Fees Paid and Date:	¢		Dece					
Zoning District Change	\$		Date					
Special Use Permit	\$		Date					
Conditional Use Permit	<u>م</u>		Date					
ETZ	\$		Date					
EIZ Plan Commission	\$		Date					
Plan Commission Deard of Appeals	ቅ		Date					
Other	ቅ		Date					
Other	ъ		Date					

### Attachment C – Photo Log of Proposed Site





Project Site



Location of Photographs







### Attachment D – Building & Stack Heights

ID #	Building / Structure	Max. Height (m)	Max. Height (ft)
´1-12	Digester	26	85,3
13-15	Mixingtank	6	19,7
16-18	Storage tank	12	39,4
19-20	Pasteurisingtanks	11,5	37,7
21	Mixingtank	12	39,4
22	Pultank	6,5	21,3
23	Separation container	8	26,2
24	Pump container	3	9,8
25	Industrial tanks	16	52,5
26-27	Loading tanks	2,5	8,2
28	Recieving Hall Industrial waste	15	49,2
29	Recieving Hall Turkey litter	15	49,2
30	Recieving Hall Cattle slurry	12	39,4
31	Recieving Hall	15	49,2
32	Biological Air Treatment	7,5	24,6
33	Gas Upgrading / Boilier Building	6,5	21,3
34	Desulphursation	15	49,2
35	Flares	9	29,5
36	Stack Boiler	0	0,0
37	Stack Airtreatment	55 - 65	180 -213
38	Air Coolers	3	9,8
39	Office Building	6	19,7

### Attachment E – Local & WI DNR Approval Requirements

### Ellsworth permit

- 1. VILLAGE OF ELLSWORTH DEPARTMENT OF PUBLIC WORKS PERMIT
- 2. VILLAGE OF ELLSWORTH PERMIT APPLICATION Excavation/Filling/Grading
- 3. Building Permits and Building Inspector All-Croix Inspections, LLC.

Wisconsin DNR permits:

### Air, Stormwater Permits:

- Air permitting
- Wastewater permit
- WIDNR Stormwater permits
- General Permit to Discharge Construction Site Storm Water Runoff Wisconsin Pollutant Discharge Elimination System (WPDES) Permit No. WI-S067831-5.
- Water Reg & Zoning
- General Permits for Land Application

EB facility would be designed in accordance with the codes, standards, regulations, and ordinances that may to apply to the design of the storage tanks and containment area include:

- U.S. Department of Agriculture (USDA) NRCS Code 313
- USDA NRCS Code 634
- USDA NRCS Code 366
- Wisconsin Department of Agriculture, Trade, and Consumer Protection (ATCP) § ATCP 33, § ATCP 50, and § ATCP 51
- Wisconsin Department of Natural Resources (NR) § NR 115, § NR 116, § NR 151, and § NR 243
- No wells are located on the proposed facility site, and the construction of new wells is not proposed as part of the planned facility.
- No hazardous materials would be used or stored at the plant during construction of the facility. During construction, any non-hazardous solid waste would be disposed of through an off-site contracted waste hauler, with construction debris being taken to an appropriate permitted landfill for construction debris. In the event that potentially hazardous materials are required to be used during the operation of the facility associated with the amine scrubber for the gas treatment process to remove H<sub>2</sub>S and CO<sub>2</sub>, these materials would be transported in accordance with all applicable regulations and stored in accordance with their Material Safety Data Sheets. Secondary containment would be implemented if quantities of these potentially hazardous materials exceed the Spill Prevention,

Control and Countermeasures, 40 CFR Part 112 federal standards. No hazardous wastes would be produced as part of the facility operation.

- Fire Protection Plan, Fire Fighting Setup Areas:
  - EB will provide a complete fire protection plan and firefighting setup area for the facility, designed and installed in compliance with all applicable local and/or State codes, regulations and Village's insurance carrier's requirements.
  - 2. The fire main system will be supplemented as required by portable extinguishers located in strategic locations throughout the Facility.
  - 3. The Fire Protection Plan and Fire Fighting Setup Area will be provided to Village as part of the building permit process. EB will coordinate with the Village's fire chief regarding these items prior to submittal of the building permit.

### Attachment F Ellsworth Community Odor Plan

This plan will be developed and implemented with assistance of an odor expert in close cooperation with personnel of the community and EB.

The community Odor Plan for Ellsworth will initially include an Odor Assessment Report, setting a "base-line" for existing sources of odor and odor characteristics. This might include an initial education session to provide some general education about odor science, measurement, and community survey management.

The odor assessment will address all existing odors including those from:

- Ellsworth Cooperative Creamery
- West central Wisconsin Biosolids Facility
- Ag Partners Coop
- Brandvale Dairy Farm

As part of the odor management plan, odors will be monitored against the base-line and a point of contact will be established at the plant.

As the baseline odor survey is designed to gather information about community odors prior to the construction and operation of the agriculture biogas plant, it is similarly important to understand the odor complaints occurring within the community ahead of the construction and operation of the agriculture biogas plant.

Therefore, in a second step it will be discuss how odor complaints should be received, what information is collected, and what follow-up is done by the recipient(s) of the odor complaints for the new biogas plant. From this information, a standardized procedure for collecting odor complaint information can be developed. It is assumed the Village of Ellsworth will assist in a campaign to make the community aware of ways to submit complaints.

A complaint monitoring system can be installed by EB including date, and time, nature of complaint, name of complainant (if given), with a summary of investigation and actions taken and their results (further odor observation at the location of the compliant as intensity, persistence and character, weather conditions.

The outcome of an investigation will determine the corrective actions to be implemented by EB on site (as review of the waste acceptance procedure, review of the effectiveness of the pre-filter and biofilters, review of training to ensure housekeeping is to a high standard throughout the site, review of planned maintenance procedures.

Attachment G Odor Treatment Plan for Bigadan's Biogas plant of Kliplev in the City of Aabenraa, Denmark.

### Odor Treatment Plan for Kliplev biogas plant in Denmark and requirements of the Danish Environmental Protection Agency and Municipality

### <u>Requirements for the biogas plant (Kliplev) in Denmark</u>

- The limit value is set on the basis of the Danish Environmental Protection Agency's odor guide, which recommends limit values of **5-10 odor units/m3**.
- Furthermore Aabenraa Municipality sets additional conditions to ensure that the biogas plant does not impact neighboring areas with odor concentrations greater than 5 LE/m<sup>3</sup> in residential areas and 10 LE/m<sup>3</sup> in rural areas.

Potential odor sources / activities and measures implemented for the Kliplev biogas plant (conception/operation)

The following description outlines the potential odor sources and measures taken to control odor emissions in order to minimize negative impact on life quality of local inhabitants.

As an example, the extraction of air and the air treatment system of the Danish plant of Kliplev is visualized in the process diagram in violet below.



Figure : Flow diagram representing in violet air extraction system for buildings and tanks and line of air treatment

The general ventilation system extracts odor and vapors from biomass handling and ensure a good working environment and minimizes emissions to the atmosphere.

The ventilations system is designed to pick up odors directly at the source. For instance, air from the solid biomass pit and replacement air from receiving tanks is picked up by specific exhausts and prefiltered before the air is lead to the main filter and into the atmosphere. Lesser odorous air, which still requires treatment, like the general ventilation of the receiving halls, is ventilated directly to the main filter.

The design airflow for the air filter depends on the maximum airflow from the buildings and tank suction. The receiving halls are kept at a slight negative pressure and have forced ventilation during unloading to ensure that air moves into the hall from the surroundings when the doors are opened for trucks entering/exiting. Displaced air from vehicles is discharged inside the receiving hall, so this air is directed along with the ventilation air from the hall to the air filter.

All receiving tanks are equipped with negative pressure ventilation to create inward airflow, and all process tanks are gas-tight. Tanks not connected to the air filter are connected to the gas storage, except for storage tanks with degassed slurry, which are provided with a solid cover. Therefore, odor from this plant will only occur in exceptional cases.

Biomass is transported to and from the facility partly through closed piping systems and partly in closed tankers/vehicles. Vehicles leave the receiving halls cleaned.

The digestate is stored in a covered tank.

In the case of the EB project in addition a post-treatment of digestate will take place in enclosed hall.

Some of the liquid digestate produced will be recirculated within the system. Any Digestate that isn't recirculated will be sent to the sealed end storage tank awaiting export from site for application to land as a nutrient water high in nutrients. The remaining solid residue which consists of extracted fiber will be stored securely in the closed storage hall for spread to land as a rich fertilizer soil conditioner. The separation/fiber storage hall will be constructed to the same specifications as the reception buildings with fast closing doors, and a dedicated air extraction and treatment system.

Wheel washing facilities will be used to prevent the transfer of residues (odor) into other areas of the site as well as outside of the site.

The conception of the complete air treatment system will ensure reliable operation, and low odor emissions even during periods of maintenance.

Any challenges with odor nuisance in the start-up phase can be solved by installing a carbon filter on the exhaust. In this way, the exhaust air is cleaned of odors until the biological filter is running optimally.

The plant's air treatment system collects ventilation air from the plant's reception halls, replacement air from tanks that are not connected to the gas system. After treatment the air is discharged to the atmosphere through an exhaust.



Figure : Air extraction system of the plant (piping in yellow, brown and green), showing the building and reception tanks as well as prefilters and biofilters.

The following 3D model is showing more in detail the extraction system and parts of the air treatment system of the Kliplev plant.



The air treatment system consists of two parts. One part consists of a pre- and main filter for handling ventilation and replacement air from buildings and tanks respectively, and the other part consists of sulphur filters for cleaning off-gas from the upgrading plant. The air treatment system is connected to an exhaust of 65 meters.

Focus on biofilters:

A biofiltration system consists mainly of a reactor packed with solid materials (e.g. peat, perlite, compost, wood chips) on which a biofilm is formed, given the proper microbial population. When a contaminated air stream passes through the reactor, the pollutants (odor components as hydrogen sulfide, ammonia, mercaptanes, etc) are transferred to the biofilm where they are biodegraded to simple end products such as water and carbon dioxide.

Biofilters are equipped with a fixed cover and outlet. The filter's humidity and pH are adjustable. The filters are designed in such a way that it is possible to shut off parts of a filter when it is out of function. There are requirements for pre-cleaning. The conception (mass loading rate, etc.) of the biofilter ensures an appropriated residence time in the biofilter (for Kliplev : effective retention time at full load : 15 - 30 s, empty bed retention time (EBRT) at full load 30 - 120 s).

To ensure proper conditions for the bacteria in the biological filters, temperature, humidity and pH is carefully monitored and controlled.

### Dispersion modelling for the Kliplev plant in Denmark

This dispersion modelling will give a clear picture of how your odors could impact the wider environment.

Example of odor propagation map for the Kliplev plant.

The calculation result for the odor contribution (with software OML-Multi 6.2). In order to visually assess the odor contribution, it is illustrated by means of isolines in the figure below. This shows the odor propagation at a height of 1.5 meters in the area around the plant. The odor propagation is calculated with a chimney height of 65 meters.

The dimensioning of the exhaust is determined based on calculations (OML model). The OML calculations (based on the OML model) are performed in accordance with the Danish Environmental Protection Agency's guidelines on air pollution in order to ensure that the guideline limit values are not exceeded.



Figure: Odor propagation map. The map illustrates the biogas plant's odor contribution using isolines with a resolution of 1 LE/m<sup>3</sup>. The illustrated odor contribution is the 99% fractile from the biogas plant's odor sources, simulated over 10 years.

The highest odor contributions occur northeast of the plant, which is currently used as a field.

The tall chimney ensures that during normal operation, odor contributions of more than 5 OU/m<sup>3</sup> do not occur outside the plant's land register. Individual homes southeast of the plant at Bjerndrupvej are affected with up to 4 OU/m<sup>3</sup>. East from Sønderjyske Motorway at Kiplev, the contribution will be down to less than 2 OU/m<sup>3</sup>.

### Proposed Conditions for the Bigadan Special Use Permit

- A. The Conditional Use Permit addresses various site conditions related to the primary use of the facility to produce, store, sell and distribute natural gas and is approved provided it follows the site plan and approved conditions.
- B. Site Plan to be approved by the Village Planning Commission and Village Board. The development will be constructed and maintained per the approved site plan and engineering plans.
- C. The site plan shall be drawn to a scale not smaller than 30 feet to the inch, certified by a registered land surveyor, professional engineer, planner, architect or landscape architect and shall show the following:
- D. Truck traffic to and from the site will follow routes to be agreed to by the Applicant as reviewed and approved by the Village Engineer / Public Works Director. Heavy truck traffic will be required to enter and exit the facility from County Rd C. No truck parking, standing, or queuing will be allowed on County Rd C.
- E. Stormwater management, grading, drainage, and erosion control plans will be prepared by the Applicant to be reviewed and approved as part of the site plan approval prior to issuance of a building permit.
- F. Plans to connect to Village utilities will be reviewed by the Village Engineer / Public Works Director as part of the site plan approval prior to issuance of a building permit. Electrical power plans will be coordinated with Pierce Pepin Electric.
- G. Landscape plans will be provided for all affected areas of the site, to be reviewed by the Village Engineer as part of the site plan approval prior to issuance of a building permit.
- H. The facility will provide and maintain the proposed treatment for odors in the CUP narrative provided by the applicant attached hereto, and will meet all applicable federal, state, and local standards and regulations as may be imposed from time to time.
- I. The Applicant will submit a fire protection system plan and an emergency response plan for the facility to be reviewed and approved by the Fire Chief prior to issuance of a building permit.
- J. Noise from the facility will not exceed the standards dictated by the Village Ordinance.
- K. All truck arrivals and departures shall be limited to the hours of 6:00 a.m. to 6:00 p.m. Monday through Friday and 8:00 a.m. to 2 PM on Saturday. No truck arrivals or departures shall be allowed on Sundays or holidays.
- L. The Applicant will only contract with farms agreeing to submit Nutrient Management Plans.
- M. The Applicant will obtain all other required permits, licenses, and approvals, whether local, state or federal, as required by law to operate the facility.

- N. Existing and proposed grades based on Village datum (U.S.C.G.S.), drainage systems and structure, and topographic contours at intervals not to exceed 2 feet.
- O. Architectural renderings and general floor plans shall be provided for all new buildings. These drawings and plans should show sufficient detail to indicate the architectural design of the proposed building, but all design details are not required at this stage.
- P. A description of and the plan for the exterior of the structure to be erected including, size and types of window and door openings, styles of windows and doors, type and color of proposed siding, type, color design of proposed roof. The purpose of this requirement shall be to assure compatibility of the proposed structure with existing structures in the district. For example, warehousing is not permitted in the commercial district. Therefore, a pole type structure, and generally a steel sided type structure, would not be found compatible in the commercial district, particularly where the commercial lot fronts on a major traveled street or highway or is located in a business corridor.
- Q. The shape, size, location, height, floor area and the finished ground and basement floor grades of all proposed buildings and structures.
- **R.** Any other information requested by the Zoning Administrator or Plan Commission and deemed necessary to establish compliance with this Chapter and to assure the proposed development is compatible with existing uses in the neighborhood, and elsewhere in the district, and assuring adequate public facilities exist, or will exist, to service the proposed use and structure.
- S. A deposit, as determined by the Zoning Administrator, in an amount sufficient to cover the application fee, anticipated special meeting and publication fees and an advance toward anticipated engineering review or legal fees where any are anticipated.

### Attachment I Traffic Patterns



Pumped high strength waste from ECC

Routes #2 & #3

Dairy (East/South) 65-80 trucks/day Turkey Litter (South) 0-25 trucks/day

JOT DAF Solids (East/North) 4 trucks/day

Food Processing (East) 25 trucks/day

### Route-#4

Route-#1

Dairy (West) Non-Posted: 5-9 trucks/day Posted (6 wk): 25 trucks/day

Turkey Litter (West)

Non-Posted: 0 trucks/day Posted (6 wk): 25 trucks/day

Total 150 trucks/day (Incoming) 150 trucks/day (Outgoing)

Streetsblog.org – 7,000-10,000 vehicles/day on Hwy 10 through the Village