Request for Tender

Tender No: RFT_ILIVE_001

Engineering companies are hereby invited to submit a tender for the final design, support and commissioning of iLive Sustainable Development's biodiesel plant in Benoni, South Africa.

Background information to project

iLive Sustainable Development Holdings (Pty) Ltd (iLive) will through this project aim at implementing a demonstration facility to convert Used Cooking Oil (UCO), into a biodiesel product in accordance with SANS1935 Standard. Though the facility will have a production capacity of 7 million liters per year, the initial purpose is to produce 300,000 liter per year.

iLive has invested and procured an existing biodiesel production facility ideal for the aimed demonstration. The technology includes the main reactors in a batch process system, operated in a semi-continuous fashion, using an esterification (acid) reaction as pre-treatment, followed by a trans-esterification (base) reaction. In addition, a sophisticated ionic exchange resin based technology is used for cleaning or polishing the biodiesel products after water wash, and a flash evaporator to dry the diesel from water and methanol to the quality standards. This will include a methanol recovery system to help the production efficiency.

The engineering company contracted will be responsible for the final process and plant designs (building on already existing designs), procurement of required equipment, appointment of sub-contractors and successful construction and commissioning of the plant.

Scope of Work

The engineering company to be appointed after successfully tendering for this project will be responsible for the successful construction and commissioning of the biodiesel facility. Three main types of work can be distinguished:

1. Engineering support

a) Confirm and update the process and plant designs that iLive has already developed. This will consist of updated process flow diagrams;
b) Conduct the required Hazop studies;
c) Confirm and update the equipment list;
d) Liaise with Potchefstroom University and supervise allocated students to the project (more information on this cooperation to be found below);
e) Be available on a consulting basis for the duration of the project;
f) Assist in commissioning of the plant;

iLive has appointed a technical foreman who will be on the site at all times during construction and commissioning of the plant. Therefore the engineering company is not required to be there at all times during the construction and commissioning phase but will be responsible for the overall management.

iLive is in a partnership with Potchefstroom University and has committed to let students work and thereby gain experience on this project. The following work packages for engineering students have been identified:

1. Complete and model the chemical reactions and thermodynamics in Aspen. This will result in a mass balance and final PFDs. This will be done by a chemical engineering student.
2. Complete a CAD drawing of the plant layout and pipe routes. This will be done by a mechanical engineering student.
3. Complete a HAZOP study to level 3. This will be done by a chemical engineering student.
4. Design a methanol distillation column design. This will be done by a chemical engineering student.
5. Conduct a waste management assessment. This will be done by a chemical engineering student.
6. Conduct a health safety study and to complete a Safety Manual (Hazard Identification and Risk Assessment (HIRA)). This will be done by a chemical engineering student.
7. Develop a process control / basic automization proposal. This will be done by a chemical engineering student.
8. Conduct lab testing and present an interpretation and proposals for improvement on the trial batches of biodiesel. This will be done by a chemical engineering student.

It will be the engineering company's responsibility to supervise and review the work conducted. It is expected that this cooperation will also decrease the workload on the engineering company. In addition, the engineering company will have the opportunity to consult and cooperate with Potchefstroom University. Potchefstroom University has significant knowledge and experience with biodiesel production (meeting the SANS1935 Standard).

Two final deliverables are distinguished:

1. To produce biodiesel in compliance with the SANS 1935 specifications;
2. To operate the biodiesel plant at its maximum capacity; namely 15 batches, or 28,000 liters in a week;

Note: testing of the biodiesel will take place at Potchefstroom University and using the lab equipment procured by iLive. It is not required to include biodiesel testing quotes for the purpose of preparing this tender.

2. Procurement of required equipment

The required equipment that needs to be procured is based on the existing final designs of the plant and might change after the final review phase. However, for the purpose of obtaining competitive quotes between engineering companies, it is requested that the tender is submitted based on the existing design and resulting equipment list. This equipment list is available in **attachment A.**

3. Appointment and management of sub-contractors

The appointment and management of sub-contractors can be subdivided in the following main work packages:

a) Civils and site alterations; as described in **attachment B**
b) Piping installation; as described in **attachment C**

c) Electrical installation; as described in **attachment D**

Project timelines and deliverables

- ***Project award date:*** 4 September 2015
- ***Project start date:*** 11 September 2015

- ***Milestone 1 'Finalize designs and costing' deliverable date:*** 25 September
- ***Milestone 1 deliverables:***
    - Document of final designs (Process Flow Diagrams, Mass Balances, Plant Layout)
    - Document listing equipment to be procured (if any changes are required based on the final designs), including prices of the equipment to be procured. This deliverable is expected to remain mainly the same compared to the tender document.
    - Document with Scope of Work for service providers – updates are based on the final plant designs but are expected to remain largely the same as the tender document.

- ***Milestone 2 'Procurement of equipment and services' deliverable date:*** 30 October
- ***Milestone 2 deliverables:***
    - HAZOP Study report;
    - Proof of equipment and services purchased and received***;***

- ***Milestone 3 'Construction and commissioning of the plant' deliverable date:*** 30 November
- ***Milestone 3 deliverables:***
    - To build and commission the biodiesel plant and fueling station;
    - All work packages for sub-contractors to be finalized and construction to have taken place;

- ***Milestone 4 'Proving Product Quality and Chemistry' deliverable date:*** 15 January
- ***Milestone 4 deliverables:***
    - Production and testing of the first 12 batches;
    - Report on the first 12 batches incl. lab analysis reports and an operating manual;
    - Report on the techniques and knowledge to produce on-spec diesel;

- ***Milestone 5 'Proving Plant Performance' deliverable date:*** 30 July
- ***Milestone 5 deliverables:***
    - Prove 3 batches per day production over one week without failure (>95% capacity);
    - Production Report: Evidence on at least 300,000 litres of biodiesel production and at least one week of full production at higher than 95% of plant capacity achieved;
    - Lab results and design documents of the project and student research results;

Requirements for the tender

For any questions, the Managing Director of iLive can be contacted via email: werner.euler@iliveworld.co.za

To be submitted via email werner.euler@iliveworld.co.za by the 2nd of September. Time of closure of the submission deadline is 12 PM.

The project award date will be within 2 days from the tender submission deadline.

The project start date will be the 11th of September. The engineering company who the tender has been awarded to can start earlier (award date is 4th of September).

The following minimum requirements apply (without fulfilling the minimum requirements, the tender will not be assessed against the evaluation criteria):

- All items as listed in the 'scope of work' in this tender document must be separately priced; including all equipment (per line item) which will be procured and the contractors work packages.
- Readiness to start within one week from the tender award date and commitment to keep to the project timelines as presented in this tender.
- Completeness of company registration, banking confirmation, and tax good standing certificate.
- Commitment to keep to the project plan as described in the scope of work and timelines in the tender document.

The engineering company must submit a statement on its technical capacity, therein describing amongst others;

- The qualifications of the team; degrees and years of working experience of all individuals of the team as well as the CV for the project leader.
- Reference projects, including the type of project, project duration and total project cost.
- Any specific experience within the team with biodiesel production.

In addition to the pricing breakdown, the engineering company must submit a payment schedule.

Tender Evaluation Process:

The tender will be appointed based on the following scoring criteria:

Evaluation Criteria	**Max. Score**
1. Technical capacity to complete the work successfully: a) Qualifications of the team and team leader (40%); b) Reference projects (20%); c) Previous experience with biodiesel production (40%);	50

2. Price of the tendered service	50
Total	**100**

Attachment A: Equipment list

Item	Name	Order Quantity
Reactors and Processing Equipment		
#3	9000L steel underground methanol storage tank	1
#4	5,000l HDPE cylindrical tank	1
#6	Heating for 2,000 L conical tanks	2
#7	Insulation for 2,000 L conical tanks	3
#15	Heated SS Tank 15,000Ltr	1
Pumps and Control Systems		
#20	CMA 1.50 T, EBARA Pump	1
#22	Diaphragm pump, powered by a compressor	1
#26	Drum hand rotary pump	1
#27	Hand pump for acid	1
	Additive application system	
#28	Micropump + adaptor + tubing	1
#29	Mixer	1
	Meters, Gauges and Control system	
#30	Control unit (upgrades)	1
#31	Thermocouple and thermo well	6
#32	Puisi K24 (reinforced polyamide)	3
#34	Puisi K44	1
#35	Puisi K700	1
#38	Tank bund alarm	2
#41	8 Tank level measurement	2

Piping and Fittings		
	Coupling, Fittings, Unions	
#42	Ball Valves	
	Ball valve NB 40	23
	Ball valve NB 50	9
#43	Globe / regulating valves	
	Regulating valve NB 25	2
	Regulating valve NB 40	1
#44	Nipples	
	Nipple NB 15	2
	Nipple NB 20	2
	Nipple NB 25	105
	Nipple NB 32	7
	Nipple NB 40	87
	Nipple NB 50	68
	Nipple NB 65	8
	Nipple NB 80	3
#45	T-pieces	
	T-piece NB 25	18
	T-piece NB 40	26
	T-piece NB 50	13
#46	Reducers	
	25 x 15	2
	25 x 20	2
	32 x 25	2
	40 x 25	8

	40 x 25	4
	50 x 25	15
	50 x 32	4
	50 x 40	17
	65 x 50	5
	80 x 50	6
#47	90 degree bends	
	Bend NB 25	21
	Bend NB 40	61
	Bend NB 50	24
	Bend NB 65	14
#48	Hexagonal Din Unions	
	Union NB 40	18
	Union NB 50	14
#49	Piping (Sch 40)	
	Pipe NB 25	42
	Pipe NB 40	85
	Pipe NB 50	45
	Pipe NB 65	24
#50	Clear reinforced PVC hose	37
#51	Fuel hoses (per meter)	13
#52	Air hose spring rewind (14m)	20
#53	Dry disconnects	3
Tools and Storage Equipment		
	Tank, bins & dispensing	
#54	IBC Flow bin + framework	3

#55	Horizontal transport tank (2000l)	1
#56	Steel drum	5
#57	Plastic drums (20l)	12
#58	Drum Wrench and ties	2
#59	Steel drum belt heater	1
#61	Floor scale (150 kg)	1
#62	Pallet jack	1
	Filters:	
#63	Bulk Fuel Filter	1
#64	Y-strainer	2
	Storage	
#65	Cabinet: Filling and miscellaneous	1
#66	Cabinet: safety and PPE	1
	Tools	
#67	Angle grinder	1
#68	Drill	1
#69	Drill bit set	1
#70	Ladder	1
#71	Tool set	1
#72	Welding kit, including mask	1
#73	Welding machine	1
#74	Plasma cutter	1
#75	Tool extras and spares	1
Auxiliary Equipment and Systems		
#90	Air Compressor	1
#91	Extractor fans	1

	Diesel Bowser 2000ltr	1

Attachment B: Construction tasks

1. Bunded areas

Plastered and painted brick walls need to be built to contain biodiesel and vegetable oil that may leak from the process. A concrete slab of 120 m^2 will need to be constructed for the bunded areas to be built on

Bunded areas are sized such that 25% of the volume of all the tanks inside of the areas can be contained by the bund. In both cases this volume is more than 110% the volume of the largest tank.

The details are as follows:

Area #1:

- Bund volume = (9 x 2 000 L + 5000 L)×(25%) = 5 750 L
- Inside bund area = (12.15 m)×(3.5 m) = 42.525 m^2
- Bund wall height = (5.75 m^3) ÷ (42.525 m^2) = 0.135 m ≈ 14 cm

Area #2:

- Bund volume = (2 x 5 000 L + 6 x 10 000 L)×(25%) = 17 500 L
- Inside bund area = 12.6 m x 10.8 m = 136.08 m^2
- Area occupied by tanks = 6*(1.15^2)*Pi + 2*(0.9^2)*Pi = 30.02 m^2
- Bund wall height = (17.5 m^3) ÷ (106.06 m^2)= 0.165 m ≈ 17 cm

2. Chasing of pipes in concrete slab

Four pipes need to be submerged in the concrete slab outside the plant building, such that they can be covered with a steel grate.

- Approximate length: 22 m
- Outer diameter of pipes submerged: 48 mm, 33 mm, 60 mm, 60 mm
- Chosen width: 300 mm
- Depth: 100 mm

3. Other building modifications

- Build in 1.6 m double door into a boundary wall.
- Construction of a trolley ramp broad as the double door and approximately 0.3 m high.
- Break down the 11.6 m of internal double wall (5.2 m + 1 m + 3.6 m + 1.8 m)
- Drill holes for four pipes in building wall.

Attachment C: Plant piping

1. Overview

About 240 meters of pipe needs to be installed to connect 30 vessels, 91 valves and 13 pumps. The material to be used is 316 L stainless steel, with pipe diameters of 25, 40, 50 and 65 NB. 62 pipe unions will be welded to the piping, such that the vessels and pumps can easily be disconnected for maintenance.

In addition to the process piping, the plant also requires a wash basin and an emergency shower to be connected to the municipal fresh water supply.

2. Process details

A list of pipes and fittings required is given below and a process flow diagram and a drawing of the plant overview can be found at the end of this attachment. The latter drawing was made specifically to indicate where elbows are needed to turn pipes upward, downward or any other direction. Also note that colour was used here merely to help differentiate pipes and items such as movable drums were drawn in with dashed lines.

3. Scope of work

Measuring, layout planning, cutting, welding and joining of all piping, unions, valves, nipples and other fittings in order to join all equipment as per the PFD of the facility. The scope includes testing of the piping works and connections. The scope should also include all materials and transport to conduct the work on site.

4. Pipe and fitting list

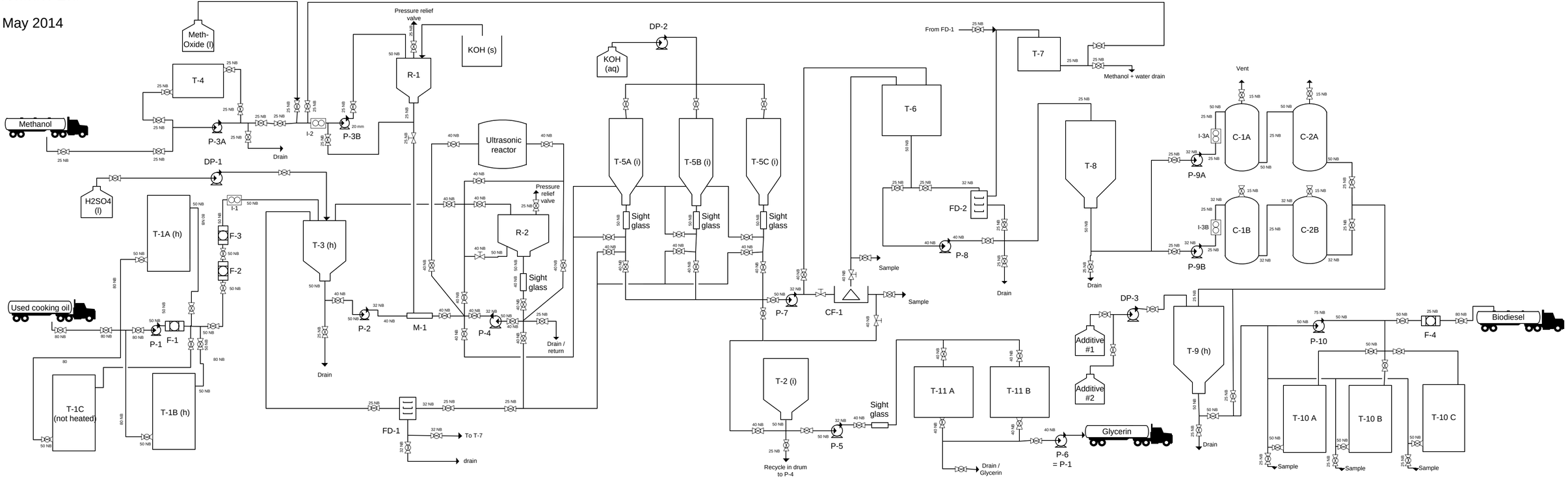
Ball Valves	Details	Number of items or length (m)
Ball valve NB 15	1 piece, 316	1
Ball valve NB 25	1 piece, 316	42
Ball valve NB 40	1 piece, 316	26
Ball valve NB 50	1 piece, 316	4
Ball valve NB 50	3 piece, 316	15
Globe / regulating valves		
Regulating valve NB 25	1 piece, 316	2
Regulating valve NB 40	1 piece, 316	1
Nipples		
Nipple NB 15	316	2
Nipple NB 20	316	2
Nipple NB 25	316	105
Nipple NB 32	316	7
Nipple NB 40	316	87

Nipple NB 50	316	68
Nipple NB 65	316	8
Nipple NB 80	316	3
T-pieces		
T-piece NB 25	316	18
T-piece NB 40	316	26
T-piece NB 50	316	13
Reducers		
25 x 15	316	2
25 x 20	316	2
32 x 25	316	2
40 x 25	316	8
40 x 25	316	4
50 x 25	316	15
50 x 32	316	4
50 x 40	316	17
65 x 50	316	5
80 x 50	316	6
90 degree bends		
Bend NB 25	316	21
Bend NB 40	316	61
Bend NB 50	316	24
Bend NB 65	316	14
Hexagonal Din Unions		
Union NB 25	316	25
Union NB 40	316	23
Union NB 50	316	14
Piping (Sch 40)		
Pipe NB 25	316	72
Pipe NB 40	316	90
Pipe NB 50	316	54
Pipe NB 65	316	24

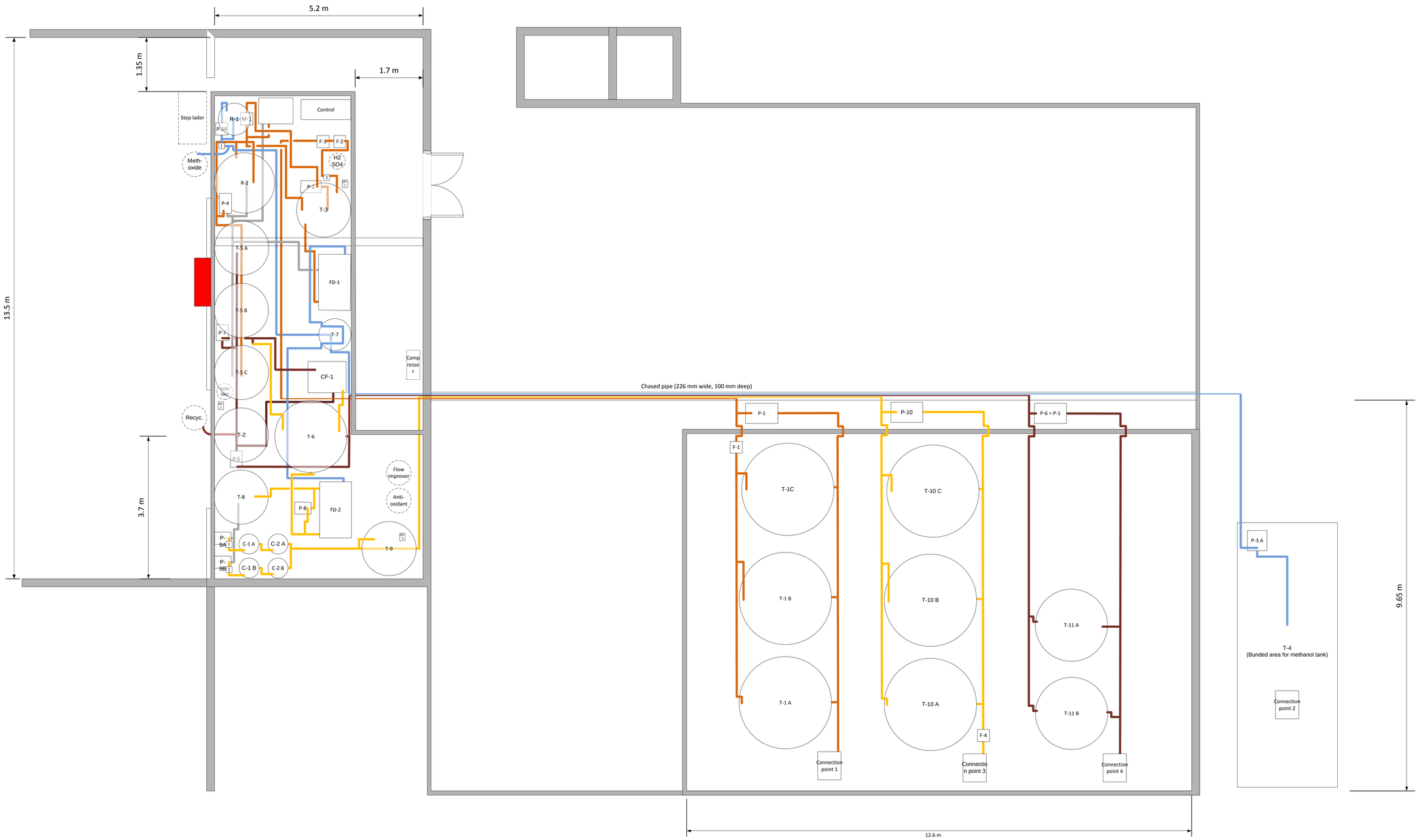
iLive Biodiesel Plant P&ID

Revision 1.9

19 May 2014



iLive Sustainable Development: Biodiesel Plant
Last modified: 6 June 2014



Attachment D: Electronics and electrical system installations

1. Work overview

The work required entails connecting various pieces of equipment and instruments with an existing control box, which needs to be upgraded. It is important to note that the site will handle methanol and produce biodiesel.

Electronic equipment

Unit	Description	Power rating	Phase
CF-1	Centrifuge	2.2 kW	3 phase
Compressor	Compressor	0.3 kW	1 phase
DP-1	Dosing pump	0.2 kW	1 phase
DP-2	Dosing pump	0.2 kW	1 phase
DP-3	Dosing pump	0.2 kW	1 phase
Extractor fan	Fan	0.3 kW	3 phase
FD-1	Flash dryer	17 kW	3 phase
FD-2	Flash dryer	17 kW	3 phase
M-1	Mixer	4 kW	3 phase
P-2	Pump	4 kW	3 phase
P-4	Pump	4 kW	3 phase
P-5	Pump	2.2 kW	3 phase
P-7	Pump	2.2 kW	3 phase
P-8	Pump	0.55 kW	3 phase
P-9 A + B	Pump	1.1 kW each	3 phase
R-2	Heating element	8 kW	
T-1 A + B + C	Heating element	16 kW each	
T-3	Heating element	8 kW	
T-9	Heating element	8 kW	

Additional electronic instruments

Vessel	Description	Power phase
T-1 A/B/C	Level measurement	1 phase
T-10 A/B/C	Level measurement	1 phase
T-11 A/B	Level measurement	1 phase
T-5 A/B/C	High level alarm	1 phase
Tank bund 1	High level alarm	1 phase
Tank bund 2	High level alarm	1 phase

Plant layout

The plant area, shown below, is 12.65 m by 3.5 m. There will also be a tank farm next to the plant with eight tanks (T-1 A + B + C, T-10 A + B + C, and T-11 A + B) with the furthest tank 20 m from the plant building. See next page.

Scope of work

ELECTRICAL INSTALLATION AND CABLING:

1. To install new control panel and supply cable from existing DB, including main circuit breaker.
2. To install cables and earth wires to 12 motors, 5 heated tanks and 2 drying units.
3. To install heavy duty cable trays from controls box to all tanks/ equipment in plant using the available service trench.
4. To do earthing on all equipment as per regulations.
5. To install a supply cable complete with starter for the extractor fan above the inside tanks.
6. To test and issue a C.O.C on completion.
7. **To purchase and install a 110 KVA diesel generator.**

BIODIESEL PLANT CONTROL PANEL INSTALLATION

8. To install and refurbish control panel, based on the following specifications:
    a. Tracing of all wiring and make up new G.A. and Schematic drawings:
    b. Rewire control panel as per new drawings produced:
    c. Testing of control panel:
    d. G.A. and Schematic drawings are included in our scope of supply.
    e. Additional starters to be supplied and installed in the control panel, as follows; 1
    f. off CF-1 Centrifuge 2,2KW 3Ph D.O.L. starter, 3 off Dosing pumps 0,2KW D.O.L.
    g. starters and 1 off R-3 Ultrasonic reactor 4KW 1Ph D.O.L. starter:

h. Supply, install, connect and test 2 off MR1 Temperature controllers:

i. Supply, install, connect and test 2 off 17KW D.O.L. starters for Flash Dryer units:

Plant layout drawing