Renewable energy

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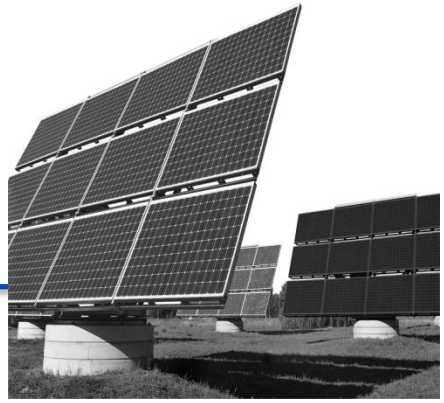
AVIVA

Today's focus

Wind

Solar



Small Hydro

Bio

What's the fuss?

- Environmental?
- Four Financial Benefits

1. Payment for electricity produced
2. Additional Payment for electricity exported to grid
3. Reduced Electricity bill
4. Stable and Predictable Income and reduced payback time on investments

Why?

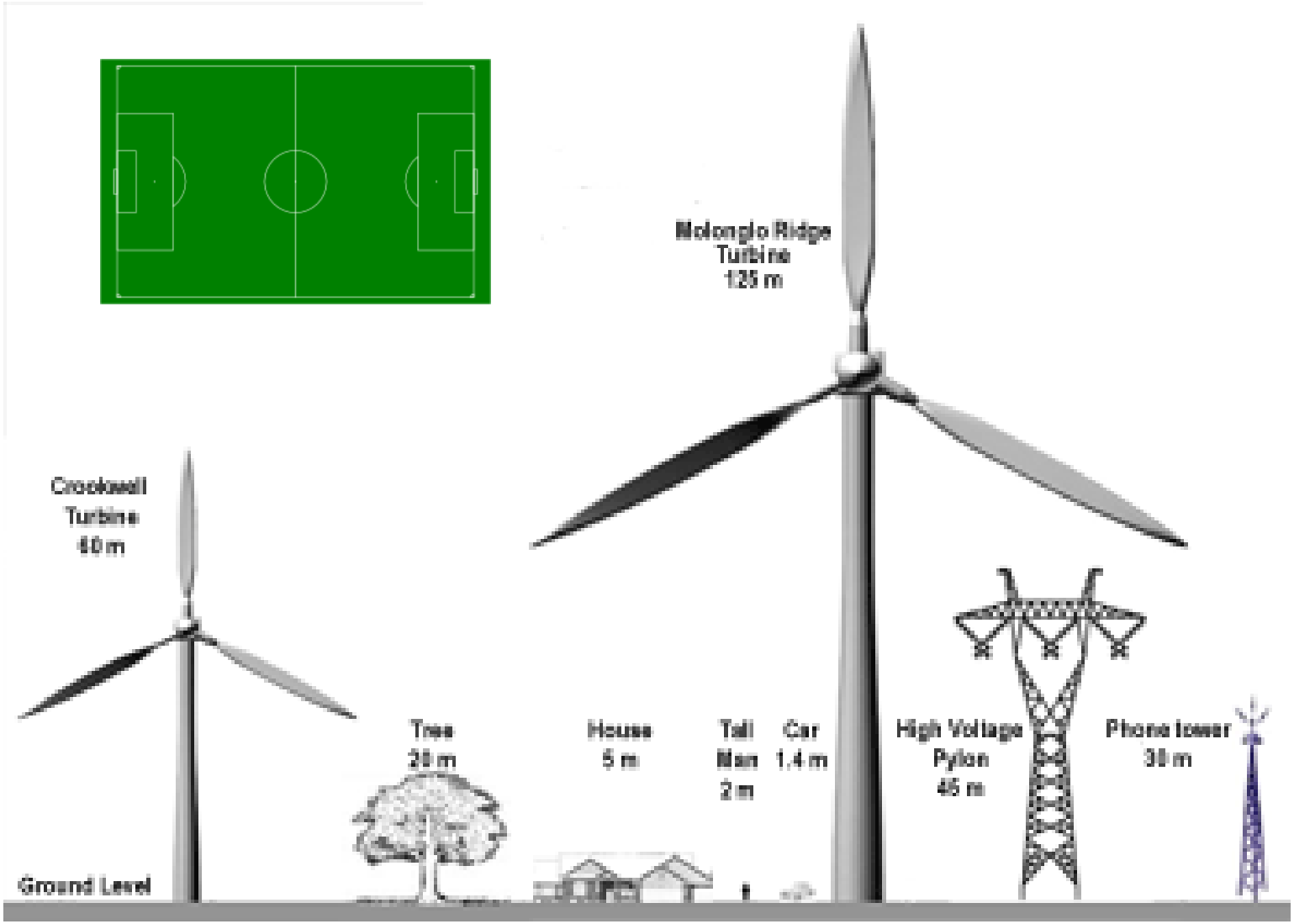
- **Feed-In Tariff (FIT)**
  - 20/25 year tariff for various small scale (<5MW) power generation
  - Applies to:
    - Wind
    - Hydro
    - PV
    - AD

- **Renewable Heat Incentive (RHI)**
  - Long term tariff for renewable heat generation

Wind power

- Derived from windmills
- Conversion of wind energy – kinetic into electrical energy
- EU Installed Wind Energy Capacity 117GW (of which 110GW is onshore).
- (EWEA: Wind in Power: 2013 European Statistics)

An ever-evolving industry



Protecting the future of the wind industry

- Larger turbines
- New designs
- New manufacturers
- New methods of installation
- Different vessels
- Logistics onshore/offshore
- Increasing demands from financial institutions
- Manufacturing bottle necks
- Availability of qualified service and maintenance personnel

Underwriting Considerations

- Under warranty with remote monitoring
- Maintenance and servicing
- Accessibility
- Ground Conditions
- Single transformer for multiple turbines (BI exposure)
- Direct Drive (i.e. no gearbox) and auto shut down

Why insure – wind turbines?

Really?

Solar energy

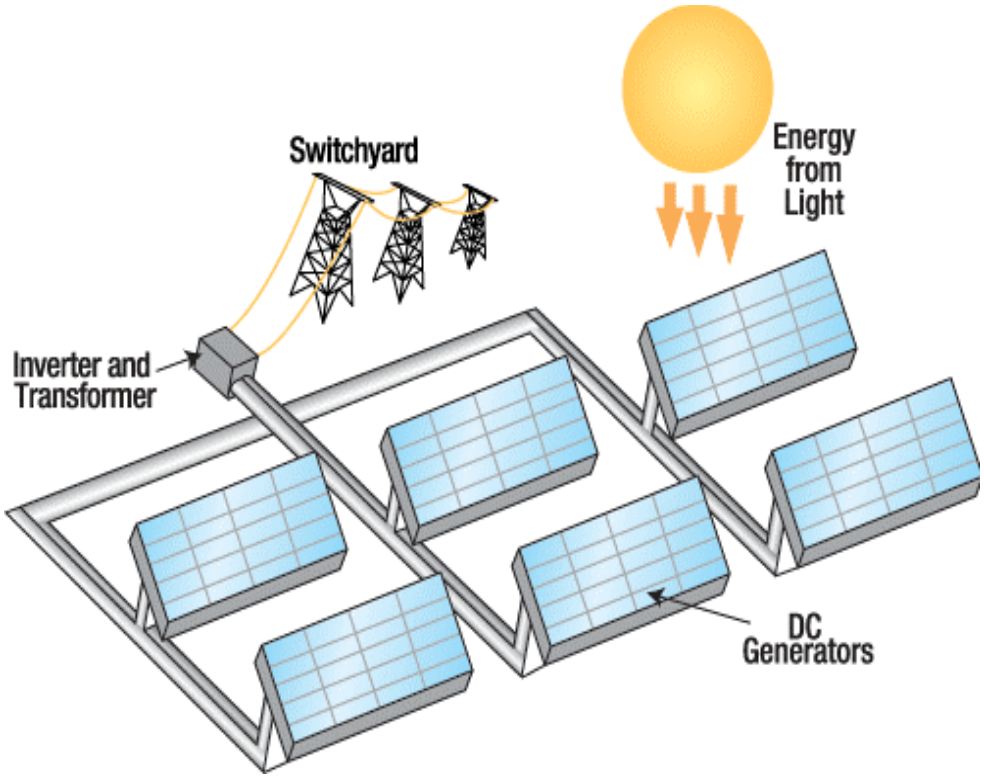
Variety of technologies used:

- Solar Thermal
- Photovoltaic

Key issues:

- Theft
- Natural Catastrophes
  - Wind
  - Hail
  - Livestock?

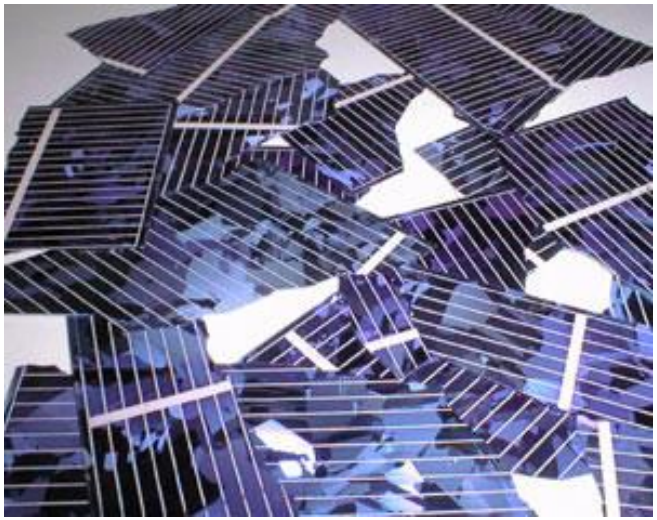
Solar PV Energy – How does it work?



Underwriting Considerations

- Roof or ground mounted?
- Building suitability (e.g. Farm Steadings)
- Ground Mounted
  - Flood Plains
  - Poor Site Maintenance (fire)
  - Trackers (breakdown and wind)
  - Single Inverter or transformer (BI exposure)

Why insure – Solar installations?



Other Considerations…

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Fire service raises solar panels shock concerns

Fire crews in Devon and Somerset have been warned by bosses to be careful of solar panels at emergency scenes in case they get electric shocks.

Devon and Somerset Fire Service said it was concerned cables from panels could remain live, even after they were disconnected.

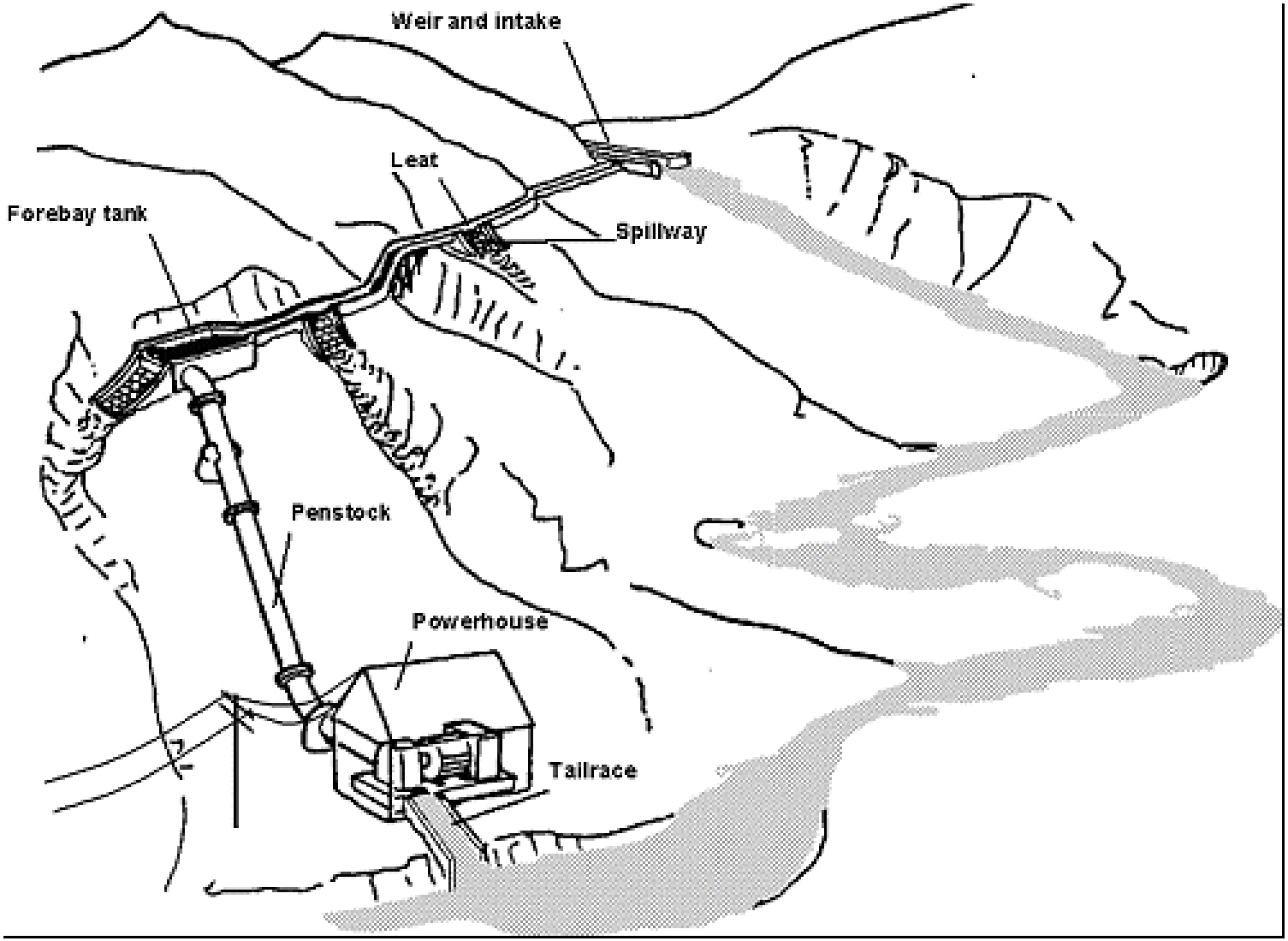
There were also risks of panels falling on firefighters, it added.

Firefighters said solar panels could remain live even after being isolated

Small Hydro

- Run-of-the-river: the natural flow and elevation drop (head) of a river are used to generate electricity. Power stations of this type are built on rivers with a consistent and steady flow.

Overview of a Run of River Scheme



Run of River Schemes

Small Hydro

- **Equipment** - supply of equipment from new entrants to the Global stage
- **Cost** - other technologies becoming more cost effective, hydro less so still, as labour has intensive civil works
- **Natural Perils** - Landslide, Snowslide, and Flood. The risks are increasing due to prevalence of more extreme weather events
- **Distribution** - Often, hydro plants are in remote areas resulting in Transmission & Distribution problems
- **Maintenance and monitoring**

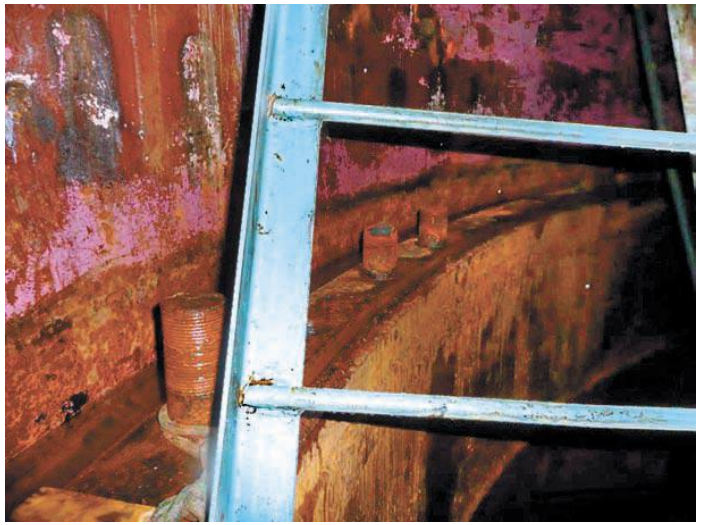
Rake & chain

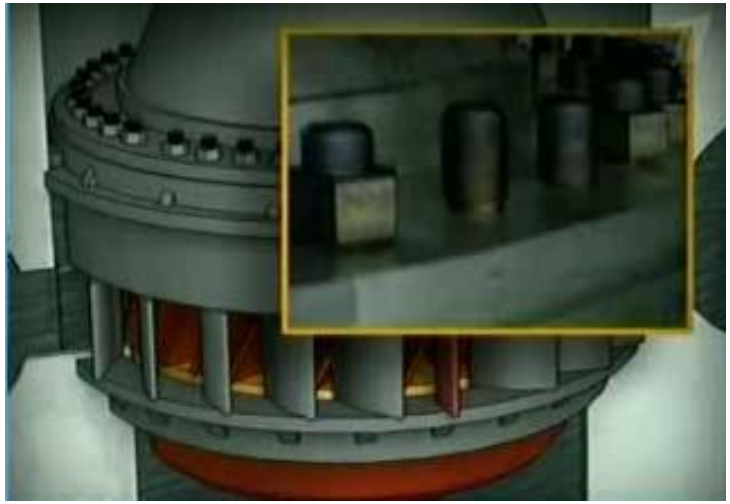
Coanda screen

Hydraulic arm

Grab & lift

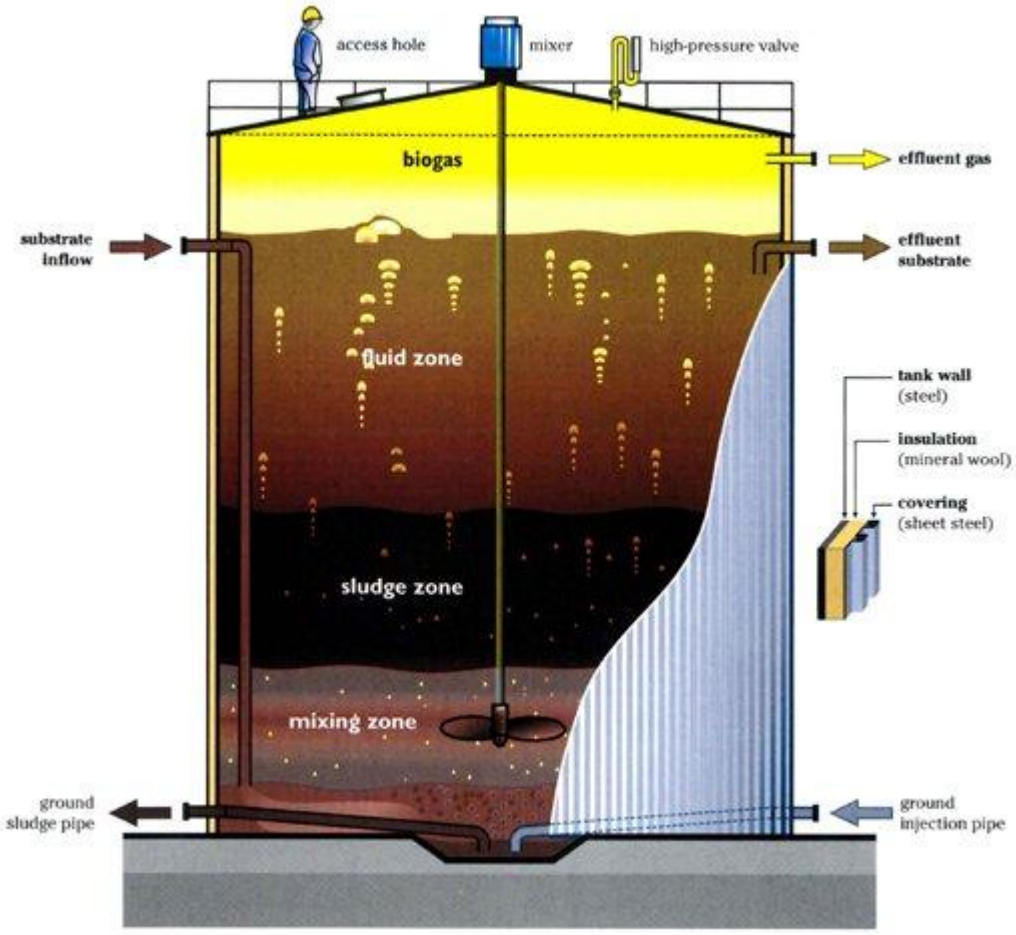
Why insure – Hydro plant?

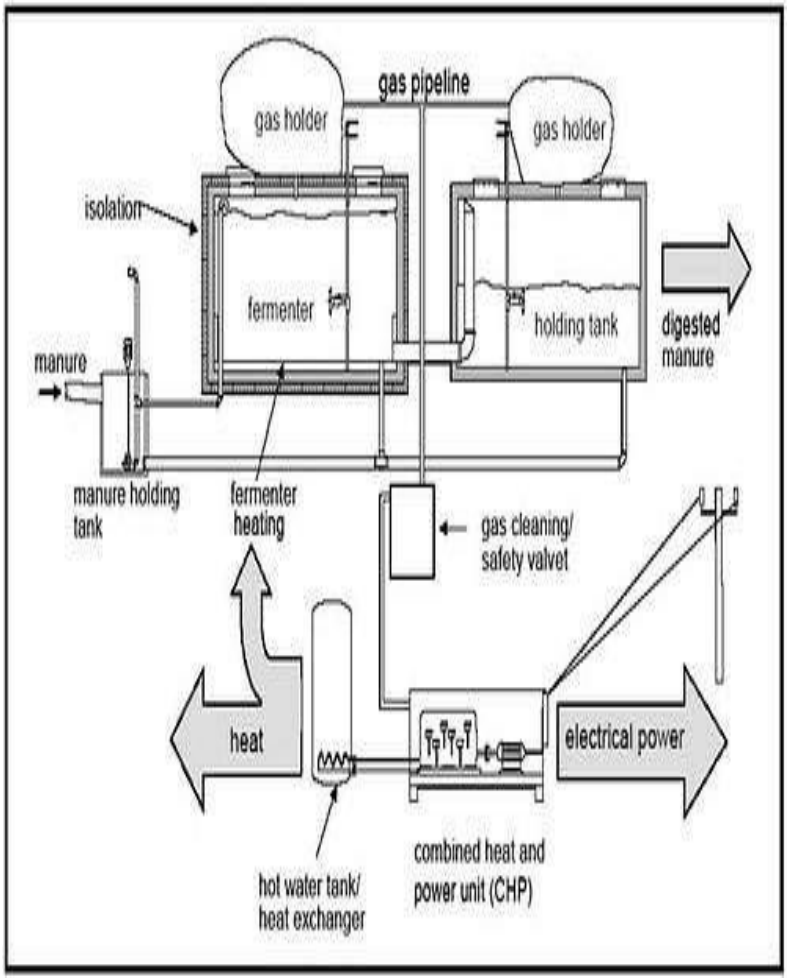




BIO Energy

BIO – How does it work?





Why insure – Anaerobic digestion plant?

Cargo and DSU

Installation and Advance Loss of Profits

Some of the issues we see in the industry

- Technical and performance challenges
- Availability of key components
- New equipment, new suppliers
- Experience of project developers
- Political uncertainty
- Availability of project finance
- Planning regulations
- Access to grid and transmission shortage


Thank you