



ITEZZE

An
IT & ES
Presentation
On
The ITEZZE EV Electricity Grid*
To Handle
The Electric Vehicle (EV) Revolution

***Formerly known as the Integrated Transport Solution (or ITS)**

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Why there is a need for **THE ITEZZE EV GRID**

Note: For this example the Australian Electricity Grid is used but grid design is similar everywhere

“The existing electricity Grids can't support electric cars.”*

*(Stated by an Origin spokesman at a Qld Dept. of Transport Seminar in March 2017)

- ▶ The power grids in any country need to be ubiquitous;
- ▶ All the appliances and equipment need to be able to plug in anywhere on it;
- ▶ The plugs, points, switches & equipment all need to be standardized;
- ▶ Manufacturers need to comply with the standard Grid load and plug requirements when they make appliances;
- ▶ Items - appliances, plugs, switches etc. need to comply with Australian Standards
- ▶ Any new items are tested to ensure they comply with National Grid Standards.
- ▶ The Australian Electricity Grid was designed in the 1930's before Toasters, TV's, dryers, air-conditioners and a host of other items were available.
- ▶ In 2017 the Average electric car drew 7.2 to 11 Kw (the Nissan *Leaf* drew 7.3 KW on slow charge and 23 KW on rapid charge) once substation load is over 315 KVA (or 44 cars x 7.3 KW) it is overloaded*. If substations overload they can explode.
- ▶ The existing Grid is not suitable for EV's so a new Grid is required for EVs. Just as existing Grid relies on 3-pin plugs to access power so the new EV Grid relies on different types of plug to connect the vehicles and transfer energy to them.

Swap Batteries are the new plugs



The existing Australian Grid

The Australian Grid has 3 distribution components -

- ▶ Transmission Lines - High Voltage 33,000 to 110,000 volts;
- ▶ Transmission Lines are running at full capacity in peak periods;
- ▶ Peak Periods are from 6 am-8 am (Mon-Fri) and 4pm-6pm in evenings;
- ▶ Regional Distribution Lines of 11,000 volts; and,
- ▶ Residential and country delivery lines to houses and farms -
- ▶ For houses these are 220-240 volts
- ▶ For farms in rural regions it is SWER (Single Wire Earth Return);
- ▶ 3-Phase power is available in some areas.

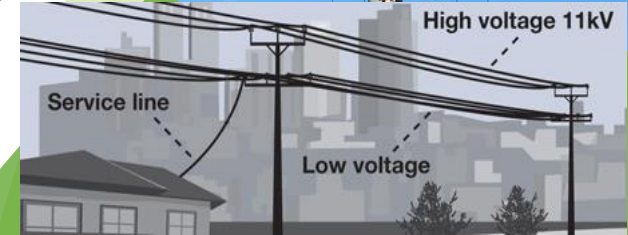
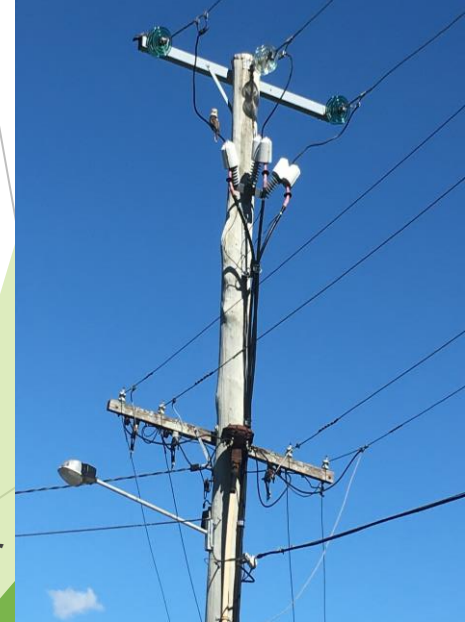
Thus, in residential areas the power is delivered via transmission lines to regional/suburb substations where it is broken down to 11,000 volts for distribution on the district Grid.

11,000 Volt wires are 3 wires which are normally above the 4 wires used in the 240 Volt (v) Grid. Wires from the 11,000v system connect to mainly pole mounted substations which convert the power to 240v. The substation which is normally 315 KVA kilovolt amps or Kilowatts (KW) then supplies on average 60 houses with the average supply per house of 5.1 KW (Kilowatts or KVA).

When they were originally laid out the biggest Grid loads were the iron; washing machine; welder (people used to weld at home) and stove. 5.1 KW was more than adequate and for 40-50 years Grids had no load problems. The Advent of Air conditioners and Plasma TV's changed this.

A large 5 KW home air conditioner can **draw 10 KW** on start-up, Stoves can draw 2 KW

*Remember the grid is not there **just to supply EV cars**, houses need stoves, air conditioners & washing machines as well





Explosion...



- ▶ The 1990's were mainly ok for Grids; but,
- ▶ In the 2000's Grid Substations started to catch fire and explode as people started to buy Plasma TV's plus they used to get home at the same time and all turned on their TV's and air conditioners simultaneously.
- ▶ 5 KW air conditioners on switch-on can draw 10 KW;
- ▶ Some homes have multiple air conditioners;
- ▶ When the draw exceeds the substation's rating - it can catch fire or explode ...
- ▶ Residential Substations are rated at 315 KW (or 315 KVA)
- ▶ 31 x 10 KW air conditioner draw 310 KW, throw in some stoves and Plasma TV's on a 315 KW substation and it can overload and...
- ▶ Nearly everyone now has air conditioners;
- ▶ When a substation explodes - it blacks out the whole suburb; and,
- ▶ It needs to be replaced with a new one;
- ▶ This can take 3-6 weeks per substation.

Substation



Boom

Boom

Boom

Boom

EV's have the Potential to explode lots of Substations...

The Energy Requirements of EV's

- ▶ On 'High Amp Re-Charge' the TESLA Model S can draw 11-16 KW;*
- ▶ Earlier EV's draw on average 7-10 KW in recharge;
- ▶ *Leaf* in the new variant takes 16 hours to recharge its battery
- ▶ The New *Leaf* on rapid charge takes 8 hours at approx. 5.1 KW;
- ▶ 5.1 KW is the normal load allowed per household (so no TV Tonight);
- ▶ 30 x Model S Teslas on High Amp recharge is 330 KW;
- ▶ The substation is rated for 315 KW (Boom);
- ▶ The average household owns 1.7 vehicles;
- ▶ This is around 102 vehicles per suburban substation;
- ▶ At an average draw of 5.1 KW the load is over 510 KW (boom-boom);
- ▶ In London (as an example) 43% of vehicles park on the street in the night;
- ▶ In Australia, normal high density suburbs have around 30-60 vehicles on the street, or on driveways or front lawns at night. Hence, they can't recharge...

The existing Electricity Grid doesn't work for EV's

The substations aren't able to carry the Load - It would take 30 years to upgrade the existing substations to take EV's**

*Remember this is on substations which provide average 5.1 KW per house and were not designed to take EV's

**Rob McIntyre former Manager Network operations at Powerlink (in Qld)

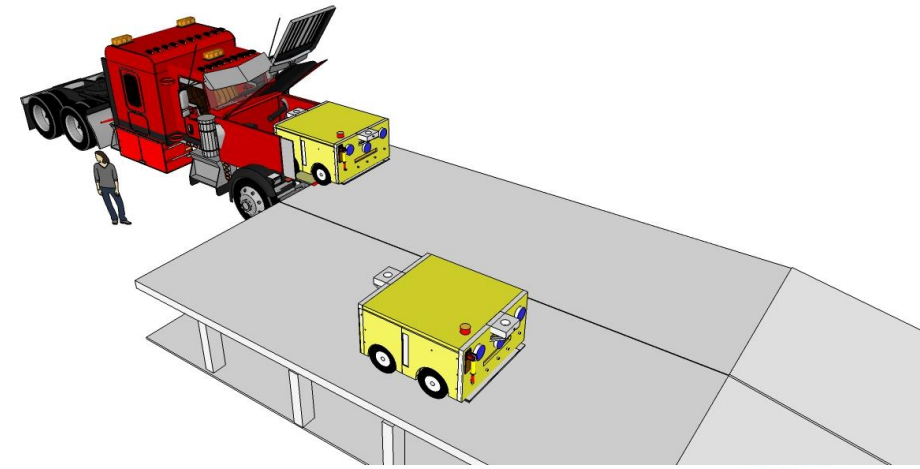


The ITEZZE EV Grid Works by:

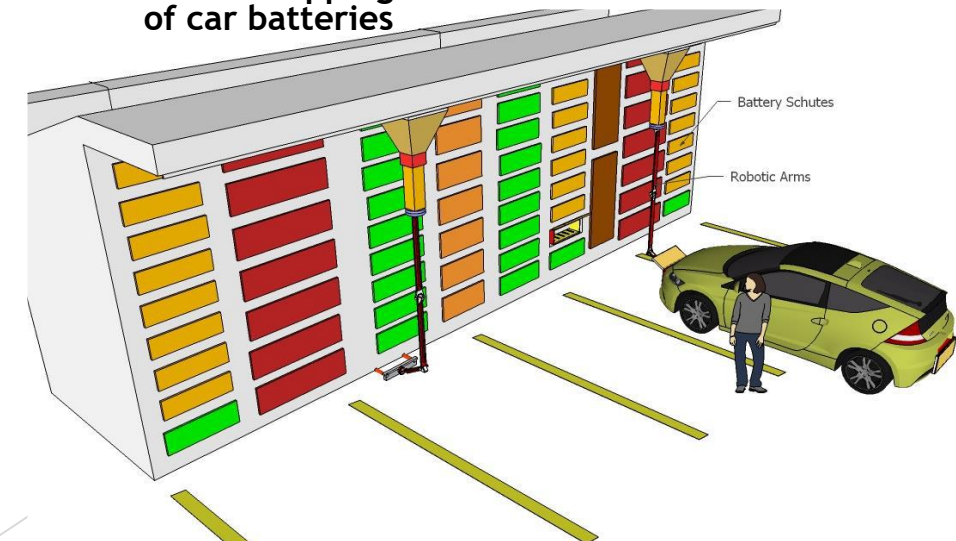
- ▶ Using a Swap and Go Battery Service for EV's in Servos;
- ▶ Power is supplied to Servo's from 11,000 volt Transmission lines
- ▶ EVs on home charge draw only 1.5 to 2 KW. Thus, ITEZZE takes the Load off the Residential Substations;
- ▶ Managing residential loads to minimize substation overload;
- ▶ Providing a fast and efficient alternative to using household power to recharge EV's and trucks;
- ▶ Allowing people to replace the ITEZZE Swap Batteries and PIG;s quickly and seamlessly in a Fast, efficient manner across the whole ITEZZE Grid Network;

This means that with ITEZZE:

- ▶ People parking on the street at night can get swap batteries on the way to work in the morning;
- ▶ Buses can run almost entirely on Solar Power with battery swaps in the middle of the day;
- ▶ Trucks, farm and mine equipment can use electricity instead of Diesel/Petrol;
- ▶ People can travel unlimited distances on ITEZZE Swap Networks;
- ▶ People can have Petrol convenience & price from EV's



ITEZZE Battery Kiosk
for robotic swapping
of car batteries



The Need for Swap Batteries - why they are essential to rolling out the New EV Grid

- ▶ World population – has gone from under 1 billion people in the 1880's to 7.7 billion now;
- ▶ It is underpinned by the use of oil in farming, mining, construction and road/rail transport;
- ▶ Oil becomes unviable as a fuel when oil prices pass US\$170/barrel (Diesel at \$3/litre);
- ▶ Watch [A Crude Awakening - The Oil Crash - Bing video](#) – it shows the need to transition off oil and how only solar energy (which ITEZZE technology can use) will succeed;
- ▶ Oil began as solar power anyway which was then converted into oil by plants/animals;
- ▶ University input – Stanford University Professor (who speaks in the last 20 minutes above) tells how **neither** tidal or **Hydrogen** will work in Agriculture and transport;
- ▶ A 40 KWH LAVO Hydrogen battery (see LAVO.COM) is the size of a couch – and is **not suitable** for vehicles;
- ▶ Wind is too variable and not reliable unless it is in the North Sea (now questionable also);
- ▶ The problem of using solar in buses/trucks/car and transport is they need to operate in the daytime when the sun shines; hence only swap batteries will use it effectively
- ▶ The solar production technology now working can capture adequate solar and convert it to electricity but (without swap batteries) storage is the problem...

The Battery Storage Issue

- ▶ Batteries use materials which are costly and need recycling;
- ▶ Every time energy goes into and out of a battery it costs money;
- ▶ Batteries only do a set number of cycles where the energy goes in and out;
- ▶ A measure of the cost of a KWH of energy being 'stored and used' is known as the KWH Cycle Cost;
- ▶ The amount is calculated with the following equation -

$$\text{KWH Cycle Cost} = \text{Cost of Battery} / \text{Nos. of KWH Cycles}$$

The KWH Cycle cost on batteries for starting cars is 27-47 cents/KWH (AUS\$);

- ▶ EV's need to minimize cycle cost; A cycle cost of 47 cents + the KWH cost of electricity production/delivery can make it more expensive than petrol;

Double Handling of Power

- 'Double handling' power is where it is put into one battery and then transferred to another battery;
- This then doubles the KWH cycle expense;
- It requires 1.7-1.9 KWH of electricity to replace 1 liter of petrol in EV's (and up to 3.6 KWH/litre of diesel in heavy equipment);
- **Double handling can make electric as expensive as petrol.**

²Which is Double Handling *Vanadium Flow batteries info can be found at: www.uetechologies.com



Replacement of Oil Requires - A New Paradigm

Oil is - **The Differences between Electricity and oil fuels are -**

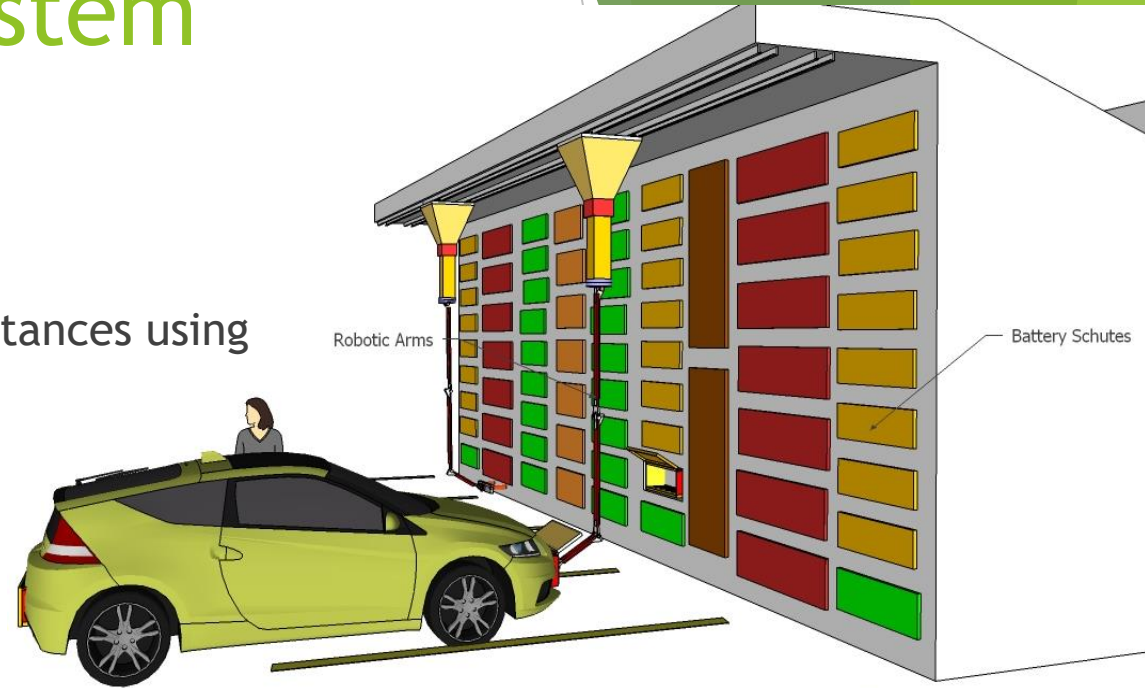
- ▶ Produced in distant locations; then,
- ▶ Transported by road tankers, rail, pipes, oil ship tankers to refineries; then -
- ▶ Transported from refineries (by some of above) to bulk storage Sites in Transport Companies or Service Stations (SERVO's) for on-sale to motorists;
- ▶ Oil has a vast dedicated infrastructure and provider network.

Energy (Electricity) is -

- ▶ Produced in distant locations or on residential roofs; then,
- ▶ Transported by wires to resale sites; transport sites or users (homes); or,
- ▶ Used onsite by homeowners/businesses and farms etc.;
- ▶ Transported **by Wires** from production to homes or for use in Transport Company Sites or Service Stations (SERVO's) for storage in Swap Batteries for on sale to motorists;
- ▶ Putting it into supercharge storage batteries in a Servo then moving it into batteries that are built-into cars/truck is **'double handling'**;
- ▶ High Voltage Transmission Wires can replace a large part of the oil Network;
- ▶ Transmission losses - wires only lose 10% of the power over 1000 km; and,
- ▶ Local transmission of solar from residential roof tops to local servos is very attractive.

The ITEZZE swap battery System

- ▶ Computer-controlled 'swap and go style' battery system;
- ▶ Patent protected;
- ▶ Batteries can be quickly swapped in vehicles of all sizes
- ▶ ITEZZE Electric vehicles can therefore travel unlimited distances using the network of ITEZZE equipped 'service stations'
- ▶ More efficient use of energy
- ▶ No '*Double Handling*' of electricity;
- ▶ Better for the Environment
- ▶ Uses existing infrastructure -
 - ▶ The High Voltage Electricity Grid in Australia has enough **capacity** when using ITEZZE to run the nation's cars/trucks on electricity;
 - ▶ Existing Service stations can be upgraded or new sites can be built to use ITEZZE
- ▶ Cost-efficient based on today's oil prices
- ▶ Becomes even more economical as the price of oil continues to rise
- ▶ Works in agriculture/earthmoving equipment; mine trucks and heavy transport
- ▶ Mining and Agricultural operations can establish their own swap 'service stations' or TCO (Transport Co. Operator sites) to recharge and swap their PIG's onsite.
- ▶ Reduces the amount of Lithium used in vehicles (there is a worldwide Shortage)



ITEZZE - why it works ...

- ▶ Swapping batteries in trucks etc. seems an obvious solution, So -
- ▶ Why isn't it used except in 'closed loop' systems like airports etc?
- ▶ The reason is economic **battery abuse**...*
- ▶ In the past people could take their swap battery EV to their holiday shack in the country or cabin on the lake ...
- ▶ Remove the battery from the car and attach it to their solar panel, and then...
- ▶ Run their house on it for 3 months while on holiday.
- ▶ They would use hundreds of charge and recharge cycles but,
- ▶ Batteries used earlier had only 1700-3000 recharge cycles in normal usage so as each KWH cycle costs (US\$)11-30 cents/KWH ... they were effectively using KWH cycles worth \$hundreds which they didn't pay for; therefore they were sending the battery Company broke.
- ▶ ITEZZE overcomes this by putting a computer chip into each and every battery pack to stop misuse and unauthorised recharging.
- ▶ And that is a major part of what was patented



* similar to what people do with Swap n' Go gas and refill it at the hardware instead of swapping the bottle

ITEZZE Low-Priced Cars

ITEZZE means vehicle makers can build low price electric cars

- ▶ Small very inexpensive AUS\$23,000 family cars with -
 - ▶ A 2½ kWh '**Regen**' battery brought by the customer; and an 11 to 14 kWh **Resident** (or 'Drive') battery rented from ITEZZE for around US\$3/day;
 - ▶ Uses a normal 3-pin household plug to recharge and has a local range of 110-130 Km;
 - ▶ Car can handle all normal weekly tasks - driving to work, shopping, kids sports and school runs etc.
 - ▶ Electric Hub or axle motor - no other motor or gearbox;
 - ▶ 1 x swap battery slot for exchange batteries;
 - ▶ The car is supplied without exchange batteries;
 - ▶ Customers can use swap batteries from ITEZZE Servos;
 - ▶ If the owner wants to go anywhere over the weekend or day trips; they simply go to the nearest ITEZZE service station and fill the slots.
 - ▶ Car price US\$15,000-\$17,000 (AUD\$21,000); plus \$2,000-\$3000 for the **Regen** battery;
 - ▶ Fuel cost for 'In Home' Recharge with 'controlled load' in ways that won't damage the substation (night off-peak) equivalent to (AU\$) 73 to 79 cents/litre (51 cents/litre US\$)
 - ▶ **CO₂** emissions with electricity generated in dual cycle gas power stations drop by 90%; or when using Solar fall to - Zero
- And...**

Lithium use is - 1/5th to 1/3rd of other EVs (or nil).* This is important because world reserves of Lithium are limited ²Report in SMH

*This TESLA has 100 KWH battery (weight 1 ton); Lithium is used as it only weighs 10 kg/KWH; other batteries weigh 16+ Kg/KWH. ITEZZE vehicles use a much smaller 'Resident' or Permanent Drive battery thus other battery materials like Nickel batteries may be used. A Tesla size 100 KWH Nickel battery weighs 1.6 tons (so its not a car but a light truck); reducing resident (built-in) battery size means that even a 30 KWH Nickel Battery only weighs 480 Kg.



ITEZZE can supply Swap Battery Systems to:



- ▶ Cars, Trucks, Buses, SUV's, 4WD's etc.
- ▶ Commercials, Vans & Road transport
- ▶ Heavy Equipment Sectors -
- ▶ Mines and Earthmoving
- ▶ Tractors, Harvesters, Irrigation and Agricultural Machinery
- ▶ Cranes and Lift Equipment

Note: ITEZZE can arrange Retro-Fit of heavy vehicles. Vehicle makers can buy Licenses to build ITEZZE enabled vehicles



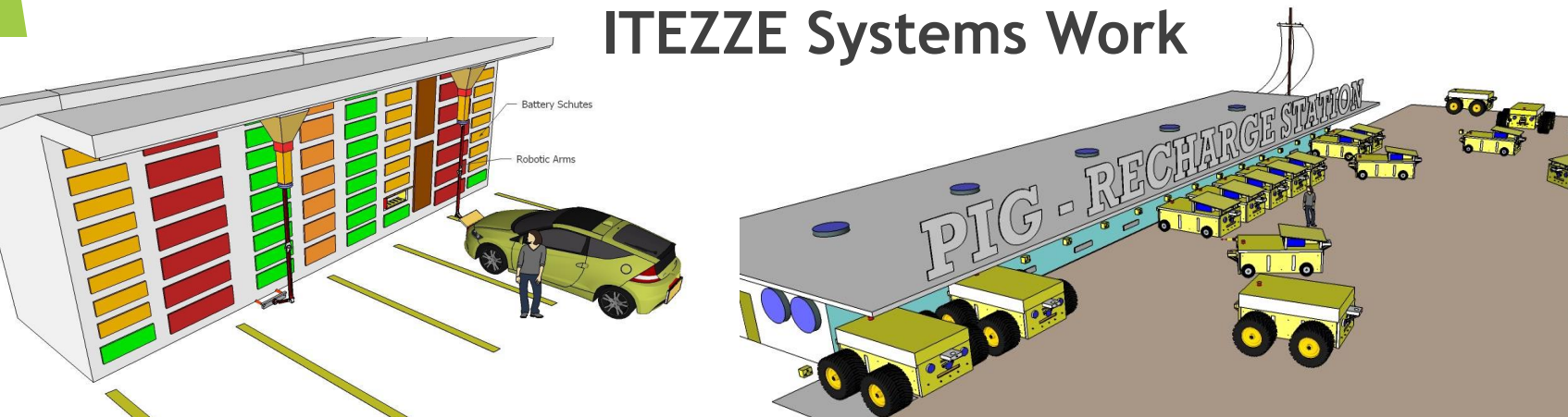
Cars/trucks, buses, tractors, mine and Farm equipment can use ITEZZE swap batteries

ITEZZE is the One System that overcomes all the problems of switching from oil to Renewables/solar and,

Can overcome all the problems of other EV systems –

- ▶ Inadequate Grid supplies during Peak Periods 6-8 am and 4-6 pm
- ▶ Supercharging shortcomings;
- ▶ Battery Risk for Manufacturers;
- ▶ Battery Fires;
- ▶ Low Range and long re-charge times on trips

ITEZZE Systems Work



ITEZZE EV Grid works because it can 'Piggyback' on the existing High Voltage Grid & replace EV power draws on Residential Grids

ITEZZE can use the existing High Voltage grid

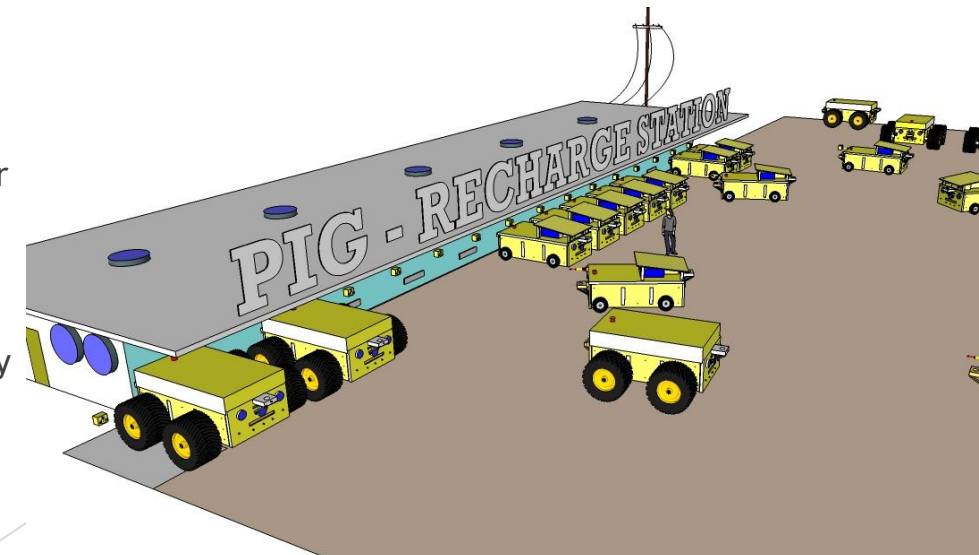
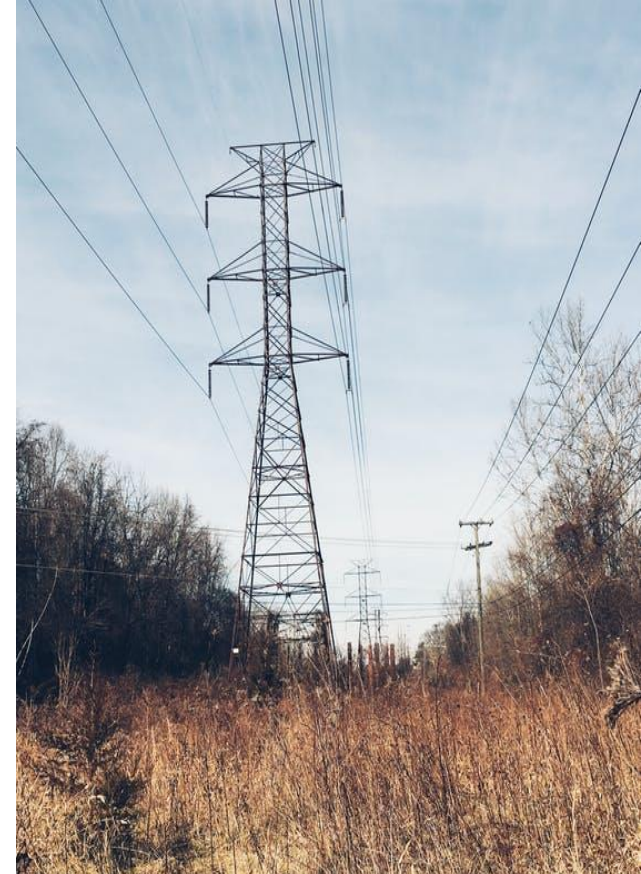
but it does need to be managed - ITEZZE can use -

- ▶ New Generation batteries can *Fast charge* 500 KWH in 30 minutes
- ▶ This is equivalent to 1 MW of power load draw;
- ▶ Regional SWER Lines are 960 KW and can't support this Recharge
- ▶ And, the Grid is closed to more load from 6-8 am & 4-6 pm
- ▶ So, EV's and Equipment are unable to recharge then; except,
- ▶ With ITEZZE, electricity can be put into Swap batteries in '*off peak*' which can then be used for swaps during Peak Periods;
- ▶ The battery requirements of running this system means there is no spare battery capacity to run '*Double Handing*' - *The only solution is ITEZZE*

ITEZZE makes maximum use of solar* -

- ▶ Australian electricity Co's can store solar electricity from 'farms' and rooftops in ITEZZE Swap Servos for later use during peak periods;
- ▶ In Nth Qld (where there is plenty of sun but not many people) solar farms are being built but there is not capacity on the Southern Interconnector to move all the power to southern cities. **But,**
- ▶ There are farms and a highway adjacent to the solar farms so ITEZZE Servos can harness and utilize the power in cars trucks, tractors and mine equipment etc.
- ▶ ITEZZE batteries in servos can utilize wind power when it blows (or tidal) simply by storing it in ITEZZE swap batteries **until it is needed for Peak or in cars/trucks etc.**
- ▶ Transport Co's, Farms and Mines can have their own recharge units

ITEZZE really does work ...



* From solar Farms or Residential.