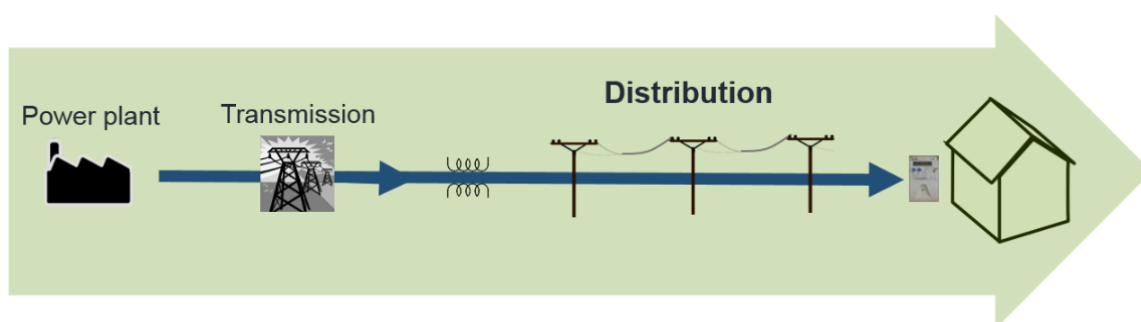


Solar battery storage and "Virtual Power Plants"

South Australia and Tesla have teamed up and made big waves with their “Virtual Power Plant” announcement earlier this year. But what is a Virtual Power Plant, what do they mean for Australia, and how do they use household PV systems?

Solar battery storage and distributed energy resources

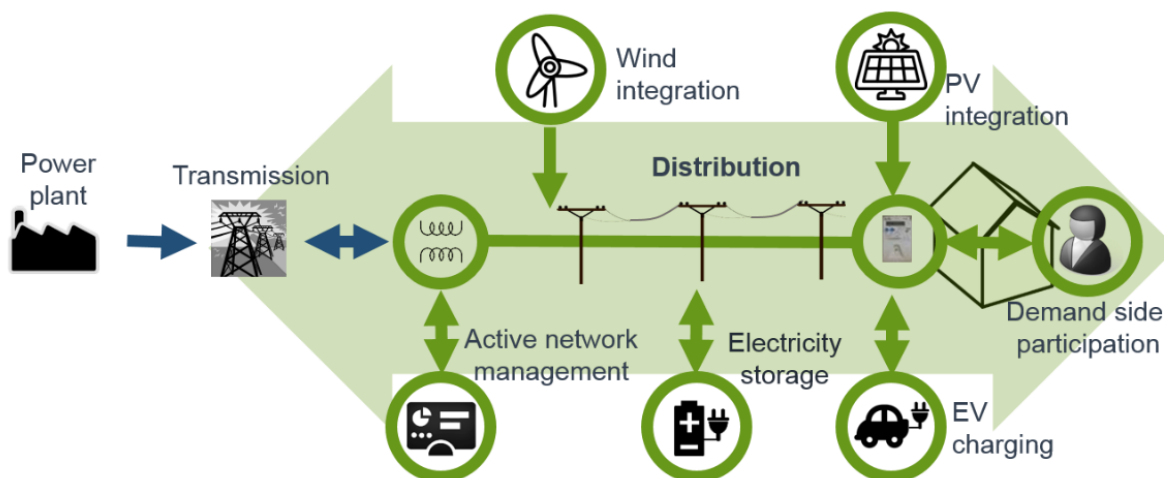
The rapid growth of residential PV systems is causing changes to traditional models of electricity generation and distribution. For most of our history, the path of electricity has been relatively simple:



[Source: EDSO for Smart Grids](#)

One or more centralised generating hubs, and one direction of travel from power plant to power lines to the user.

But what happens when several of those users are generating their own power? And some of that power needs to travel back into the electrical grid? Things become considerably more complex. Today's model looks more like a web:



[Source: EDSO for Smart Grids](#)

Power flows in both directions and many small sources of generation are brought together. In this model, each building with its own PV system or solar plus storage is classed as a distributed energy resource (DER).

Correctly integrating a growing number of DERs in today's grid infrastructure causes many challenges for grid operators and utilities – but they also open up new technological possibilities.

When multiple DERs – small-scale wind turbines, residential solar – are connected together using smart technology, we can produce a very interesting effect. The distributed components of the system can function as a single much larger system. This is known as a “Virtual Power Plant” (VPP). Surplus power can be transferred from one part of the system to another, stored, or fed back into the grid as needed, with second-by-second tracking of supply and demand.

Virtual power plants in Australia

While other countries like the Germany, the United States and the United Kingdom have also been connecting solar households together into virtual power plants, Australia is well ahead of the competition.

With strong support from the Australian Renewable Energy Agency (ARENA), Sydney-based utility [AGL began work on a 1,000 home VPP in 2016](#). In February of 2018, South Australia and Tesla announced a project that would dwarf the VPPs that came before – a [50,000 home VPP](#), to be deployed in several phases over 4.5 years.

The first phase involves Housing Trust properties that will be provided with solar panels and battery storage at no cost. The catch – the system will be owned by the utility, not the householder. For now, it is unclear whether households with existing solar panels and/or battery storage can participate in later phases.

Benefits and drawbacks of virtual power plants

There are some pretty big benefits of connecting residential solar households in this way. Tesla's enormous VPP will rival the generating capacity of a traditional fossil fuel plant – all without building a single new building. The potential reduction in carbon emissions is enormous.

Utilities and grid operators also stand to gain. VPP generation is extremely flexible, and obviously up-front costs are slashed when new buildings or distribution infrastructure aren't required. But what about the guinea pigs themselves, the customers?

The drawback of VPP for customers is handing over control of their generation and storage to whatever algorithm is being used. To sweeten the proposition, the Tesla project expects to

drop participants' electricity bills by approximately 30%. The stable local network also offers extra protection from power outages.

While households with existing solar panels aren't yet allowed to participate in the big Tesla project, many smaller VPPs are still being planned. Would you participate?