Is there a Role for Electrical Vehicles in Samoa's Transport Fleet ?

Overview

- Samoa's Fossil Fuel Predicament
- Learning From Each Other:
  Bottom up Stakeholder workshops
- Making Practical Sense of Electro-Mobility

What place technology?

Samoa's Fossil Fuel Predicament

- Petroleum imports amounted to 23% of 458 M imports in 2014 fiscal year.

  ~ 78% is used for transport (petrol and diesel)
  ~ 22% for electricity generation (diesel)

BUT

- Petroleum imports play a big part in Samoa's structural balance of payments deficit
- Fuel use is expensive given Samoa's $ 4270 (2013) GDP per capita
- CO_2 emissions (1.3 t CO_2/capita 2012) are rising fast towards Paris Agreement ceiling of ~ 2 t CO_2/capita. *(Emissions target estimated for a below 2 degree warming by 2100*)

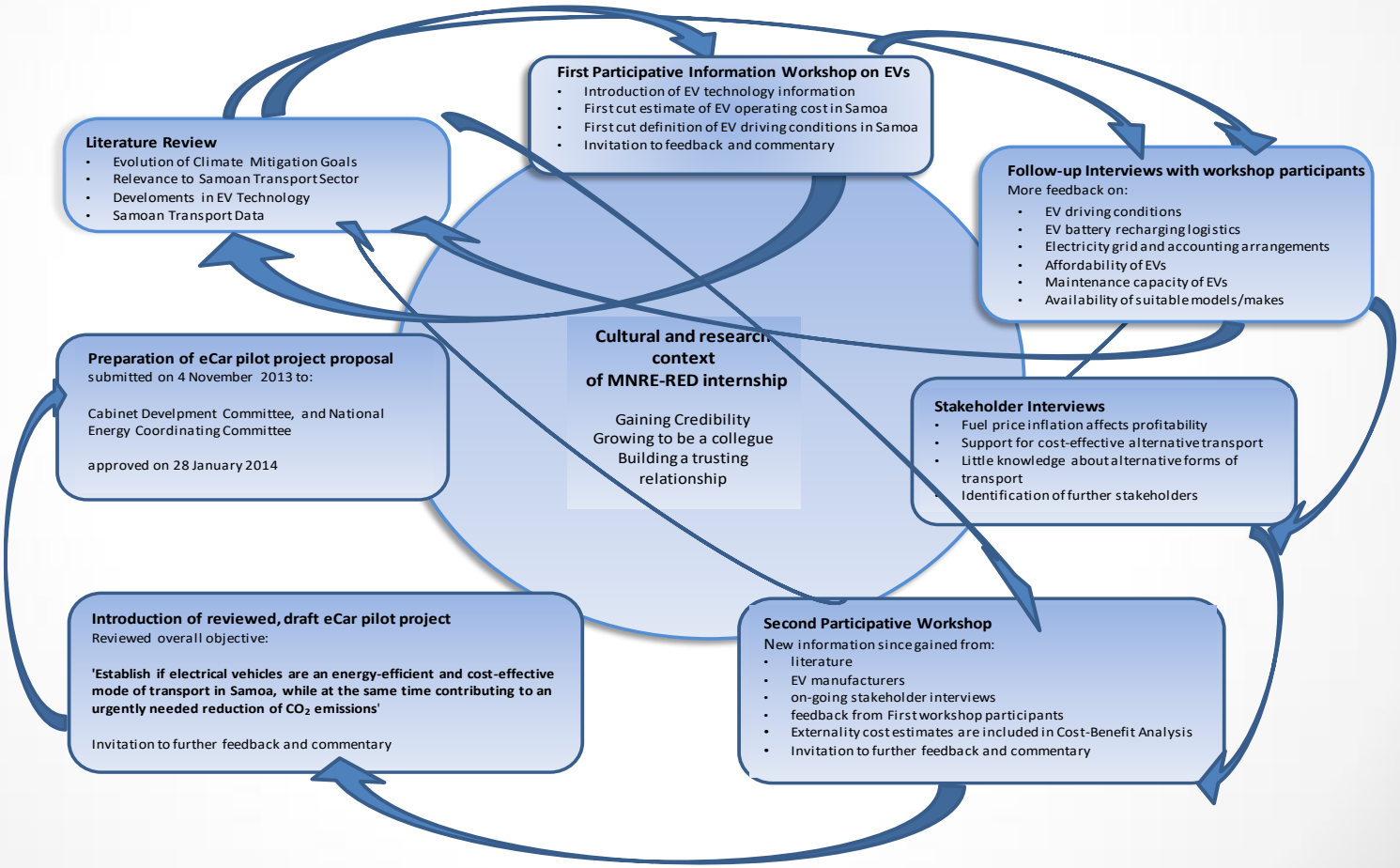
Government of Samoa Policies in the Energy Sector

- EV use is flagged as a future transport option and is supported by various Government policies (Energy Strategy, Greenhouse Mitigation obligations)

BUT

- No current knowledge on global EV development; technical, economic
- No practical local information about EV infrastructure requirements

Action Research Stages and Iterations



Key Findings of from Stakeholder Workshops

Fuel Cost Savings by EVs

Distance travelled by different fuel types on a 1WST basis

Vehicle Type	Energy Source	Energy Use	Distance travelled per 1 WST	Net Savings %	Comparison between Energy Sources/Car Types
Small compact car	Petrol	**9** *l/100km*	**3.48** */km*		
Mid-size Sedan	Petrol	**10** *l/100km*	**3.13** */km*		
Utility Pick-up Truck	Diesel	**10** *l/100km*	**3.15** */km*		
Mid-size Sedan	Biodiesel	**9** *l/100km*	**3.48** */km*	**11.0**	Mid-size Sedan BD-CV
Utility Pick-up Truck	Biodiesel	**11** *l/100km*	**2.85** */km*	**-10.5**	Utility Pick-up Truck BD-CV
Small compact car (eg Miev)	Electricity	**0.16** *kWh/km*	**6.38** */km*	**45.4**	Compact Car BEV-CV
Sedan (BYD taxi model)	Electricity	**0.18** *kWh/km*	**5.67** */km*	**44.7**	Mid-size Sedan BEV -CV
Utility Pick-up Truck	Electricity	**0.3** *kWh/km*	**3.40** */km*	**7.2**	Utility Pick-up Truck, BEV -CV

Note: Fuel cost for Diesel (ADO) WST 3.17/l, Petrol (ULP) 3.19 WST/l, Biodiesel, indicative, 3.4 WST/l;

Electricity cost of WST 0.98 /kWh

Key Findings from Stakeholder Workshops

Annual Cost Effects of Transport Modes, Nominal 1000 Vehicle Fleet

Vehicle Types	Transport Cost to Driving Public $ Million	GHG Emissions tons CO_2	Currency Reserve Savings $ Million
CV, @ $3.19/l	4.65	3920	-
EV, $3.17/l	1.82	1550	2.8
BD Blend			
@ $ 3.19/l -3.28/l			
10%-50%	4.19-4.31	3175-1764	0.416 - 1.737

Note: GHG Emissions as per USEPA; Petrol: 2.359 kg CO2/l; Diesel: 2.685 CO2/l
Source: MNRE-RED 2013

Key Findings from Stakeholder Workshops

Advantages	Disadvantages and Challenges
Short Travel Distances	Commercial EVs are unaffordable for majority of Samoans
Low Travel Speed	but prices have declined with EV commercialisation gaining momentum
High National Electrification Rate	
→ **leads to Smaller EV Battery Packs**	→ **leads to Investigation of Retrofit Conversion of Second Hand Cars**
Integrated Electricity Platform	There is no servicing capacity for EVs
Penetration of Renewables in Electricity Sector	There is no servicing capacity for Self-consumption PV units
→ Decentralised Self-consumption Renewables	→
leads towards lower Fossil Fuel Dependence, lower CO2 Emissions,	**leads to Capacity Building, Upskilling and Increased Employment Scope**
increasing National Energy Sovereignty	→ There are no EV Distribution networks and Repair Facilities
	leads to increasing Integration with Global, Innovative
	Technology Networks

Conclusions

- EVs can be operated cheaper than conventional vehicles
- Samoa's driving conditions are ideal for the operation of EVs, more so than in larger industrialised countries
- Cross-cutting benefits include significant reductions of CO_2 emissions and a lowering of demand on reserve currency
- Cost of commercial EVs is unaffordable for the large majority of the Samoan driving public in the foreseeable future
- 'Retrofit Conversions' may provide a local pathway to an affordable and sustainable form of transport
- Electro-mobility, particularly on small island nations, is ideally suited to reduce transport operating cost and provides a technology pathway with many cross-cutting benefits to economic and social development.