

# FAIR Project

By Jennifer van Langen & Lucca Ferri de Souza



# Introduction

- State of Washington's Electric Vehicle Population Data
  - USA government data
- 17 columns, each row is a Vehicle
- Limited metadata
  - Landing page has more information

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAV) Eligibility	Electric Range	Base MSRP	Legislative District	DOL Vehicle ID	Vehicle Location	Electric Utility	2020 Census Tract
1	5Y3JE1EB5K	Yakima	Yakima	WA	98901	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	220	0	15	347724772 POINT (-120.50729 46.60464)	PACIFICORP	53077001502	
2	1C4RJKU67R	Kitsap	Port Orchard	WA	98367	2024	JEEP	WRANGLER	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	21	0	35	272165288 POINT (-122.68471 47.50524)	PUGET SOUND ENERGY INC	53035092901	
3	KNDCDDLDON	Snohomish	Lynnwood	WA	98036	2022	KIA	NIRO	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	26	0	32	203182584 POINT (-122.29245 47.82557)	PUGET SOUND ENERGY INC	53061051402	
4	5UXKTC037H	King	Auburn	WA	98001	2017	BMW	X5	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	14	0	30	349010287 POINT (-122.23035 47.3074)	PUGET SOUND ENERGY INC   CITY OF TACOMA	53033029806	
5	1N4AZ0CP1D	Skagit	Mount Vernon	WA	98273	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	75	0	40	131684150 POINT (-122.33891 48.41644)	PUGET SOUND ENERGY INC	53057952304	
6	1N4BZ0CP8G	Snohomish	Marysville	WA	98270	2016	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	84	0	44	256278109 POINT (-122.1769 48.06114)	PUGET SOUND ENERGY INC	53061052710	
7	5YJ3A1Z6G	Chelan	Manson	WA	98831	2016	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	210	0	12	338404888 POINT (-120.16034 47.8854)	PUD NO 1 OF CHELAN COUNTY	53007960400	
8	7SAYD0EE7P	Snohomish	Bothell	WA	98021	2023	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not been researched	0	0	1	241608608 POINT (-122.18384 47.8031)	PUGET SOUND ENERGY INC	53061051917	
9	1N4AZ0CP5F	Snohomish	Edmonds	WA	98020	2015	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	84	0	32	173391158 POINT (-122.37689 47.81116)	PUGET SOUND ENERGY INC	53061050502	
10	WP1AE2A26G	Snohomish	Everett	WA	98208	2016	PORSCHE	CAYENNE	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	14	0	44	176239570 POINT (-122.18637 47.89251)	PUGET SOUND ENERGY INC	53061041704	
11	5YJ3A1E45K	Kitsap	Port Orchard	WA	98366	2019	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	270	0	26	272614065 POINT (-122.63847 47.54103)	PUGET SOUND ENERGY INC	53035092906	
12	5UX7A6C09M	Snohomish	Monroe	WA	98272	2021	BMW	X5	Plug-in Hybrid Electric Vehicle (PHEV)	Clean Alternative Fuel Vehicle Eligible	30	0	39	138597924 POINT (-121.98087 47.8526)	PUGET SOUND ENERGY INC	53061052203	
13	1G1F9K506H	Snohomish	Everett	WA	98208	2017	CHEVROLET	BOLT EV	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	238	0	44	321043404 POINT (-122.18637 47.89251)	PUGET SOUND ENERGY INC	53061052115	
14	5YJ3E1EB0K	Yakima	Yakima	WA	98901	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	220	0	15	240744927 POINT (-120.50729 46.60464)	PACIFICORP	53077001602	
15	1P5ED3KA9M	Snohomish	Bothell	WA	98012	2021	POLESTAR	PS2	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	233	0	44	177987680 POINT (-122.21061 47.83448)	PUGET SOUND ENERGY INC	53061052007	
16	KNDC3C1G1L	Snohomish	Edmonds	WA	98026	2020	KIA	NIRO	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	239	0	21	115041930 POINT (-122.31768 47.87166)	PUGET SOUND ENERGY INC	53061042003	
17	1N4AZ1CP1J	Spokane	Spokane	WA	99223	2018	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	151	0	6	326278200 POINT (-117.36043 47.63996)	MODERN ELECTRIC WATER COMPANY	53063004702	
18	1N4AZ0CP7D	Snohomish	Snohomish	WA	98290	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	75	0	44	185323862 POINT (-122.09305 47.91265)	PUGET SOUND ENERGY INC	53061052502	
19	1J1BFB0A6P	Snohomish	Everett	WA	98204	2023	NISSAN	ARIYA	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not been researched	0	0	21	261308225 POINT (-122.27557 47.88936)	PUGET SOUND ENERGY INC	53061041809	
20	1J1M2C5F3J	Snohomish	Everett	WA	98203	2018	HONDA	CLARITY	Plug-in Hybrid Electric Vehicle (PHEV)	Clean Alternative Fuel Vehicle Eligible	47	0	38	180431870 POINT (-122.23019 47.94949)	PUGET SOUND ENERGY INC	53061041202	
21	KNDC3S1F4R	Skagit	Anacortes	WA	98221	2024	KIA	NIRO	Plug-in Hybrid Electric Vehicle (PHEV)	Clean Alternative Fuel Vehicle Eligible	33	0	10	258938088 POINT (-122.61214 48.51748)	PUGET SOUND ENERGY INC	53067940302	
22	7SAYD0EE4P	Snohomish	Bothell	WA	98012	2023	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not been researched	0	0	1	262179630 POINT (-122.21061 47.83448)	PUGET SOUND ENERGY INC	53061051933	
23	5YJ3E1ETXR	Yakima	Yakima	WA	98901	2024	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not been researched	0	0	15	268212612 POINT (-120.50729 46.60464)	PACIFICORP	53077001702	
24	5YJ3E1EB8K	Kitsap	Bremerton	WA	98337	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	220	0	26	251048017 POINT (-122.62749 47.565)	PUGET SOUND ENERGY INC	53035080500	
25	5YJ3E1EB3K	Fairfax	Burke	VA	22015	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	220	0	15	312503502 POINT (-77.27191 38.79355)	NON WASHINGTON STATE ELECTRIC UTILITY	51059432000	
26	5YJ3E1E40S	Thurston	Olympia	WA	98513	2025	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not been researched	0	0	2	275181903 POINT (-122.81754 46.98876)	PUGET SOUND ENERGY INC	53067012331	
27	5YJ3E1EB5L	Yakima	Yakima	WA	98901	2020	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	322	0	15	237967131 POINT (-120.50729 46.60464)	PACIFICORP	53077001602	
28	5YJ3E1EB1L	Snohomish	Bothell	WA	98021	2020	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	322	0	1	4741971 POINT (-122.18384 47.8031)	PUGET SOUND ENERGY INC	53061051917	
29	5YJ3E1EB6J	Snohomish	Everett	WA	98208	2018	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	215	0	44	203436691 POINT (-122.18637 47.89251)	PUGET SOUND ENERGY INC	53061041607	
30	1WBY7Z2C52J	Thurston	Olympia	WA	98502	2018	BMW	IS	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	114	0	22	180885561 POINT (-122.92333 47.03779)	PUGET SOUND ENERGY INC	53067010520	
31	1N4AZ0CP5D	Chelan	Cashmere	WA	98815	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	75	0	12	201803941 POINT (-120.47005 47.5224)	PUD NO 1 OF CHELAN COUNTY	53007960600	



# FAIRification planning

- Goals:
  - Add rich metadata and URIs
  - Map data to existing ontologies
  - Make dataset more readable
- Stakeholders
  - Government agencies
  - Researchers
- Existing FAIR-support:
  - Identifiers
  - License

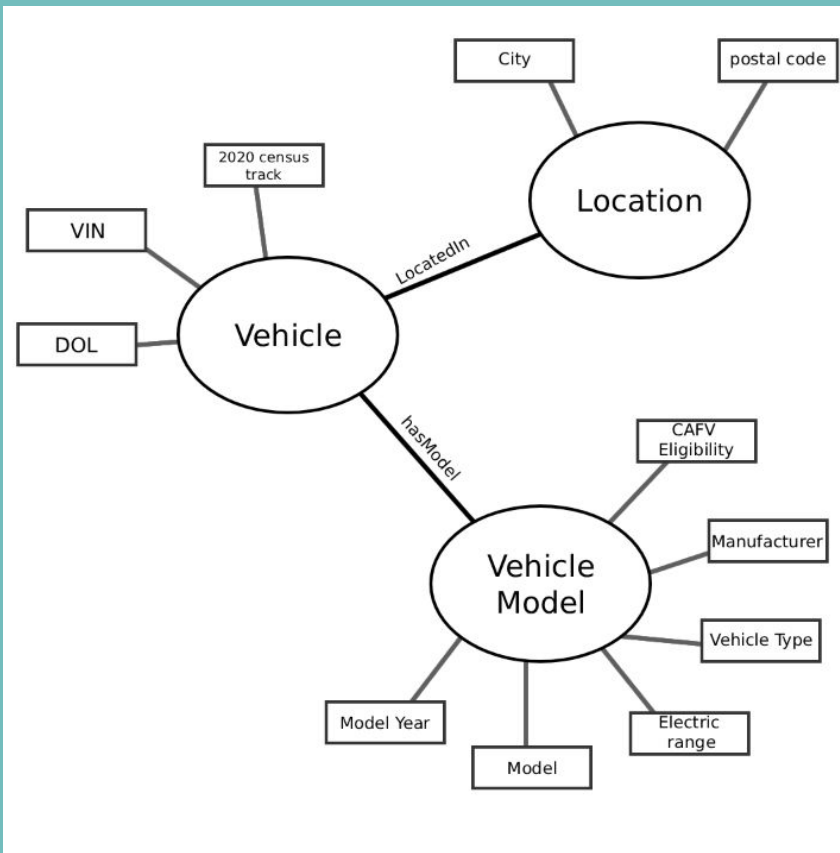


# Data Preparation

- **Removed:** Base MSRP, Legislative District, Vehicle Location and Electric Utility
- **Merged:** City, County and State into City due to Findability
- **Reconciled:** City, Make, Model and Electric Vehicle Type
- Unique global identifier

# Semantic data model

- Three entities
- Relationships
- Attributes





# Metadata schema

Findable and reusable:

- Title
- Description
- Creator
- License
- Language
- Keywords



# FAIRness improvements

- Findability:
  - Proper identifiers
  - URIs making data linkable
  - Adding rich metadata
- Accessibility:
  - Using a standardised protocol for RDF
- Interoperability:
  - Reconciliation
  - Using standardised vocabularies
- Reusability:
  - Describing the (meta)data extensively