SustainGym

A Benchmark Suite of Reinforcement Learning for Sustainability Applications

chrisyeh96.github.io/sustaingym
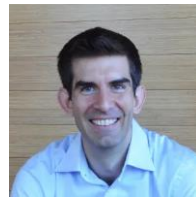

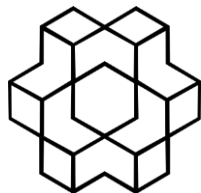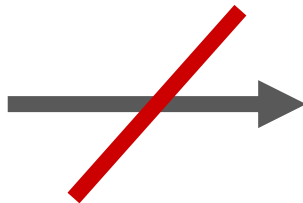Christopher Yeh   Victor Li   Rajeev Datta   Yisong Yue   Adam Wierman

Caltech

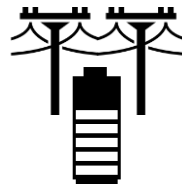# Most RL algorithms are only benchmarked on toy environments
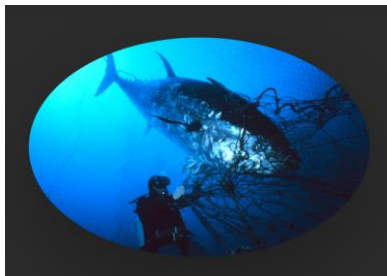
OpenAI Gym

Game-playing environments

Real-world Environments

Challenges
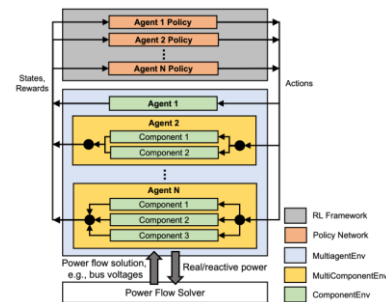- physical constraints
- distribution shifts over time

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Very few existing RL environments focus on sustainability
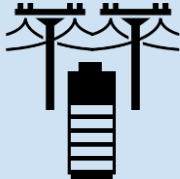

**ConservationGym**

CityLearn

PowerGridWorld

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Introducing SustainGym

Environments	EVChargingEnv	ElectricityMarketEnv	
			More environments coming soon!
Features	• physical constraints • distribution shifts over time		
Sustainability	• realistic sustainability applications • rewards agents for minimizing marginal CO_2 emissions		

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`EVChargingEnv` simulates adaptive charging schedules for electric vehicles (EVs).
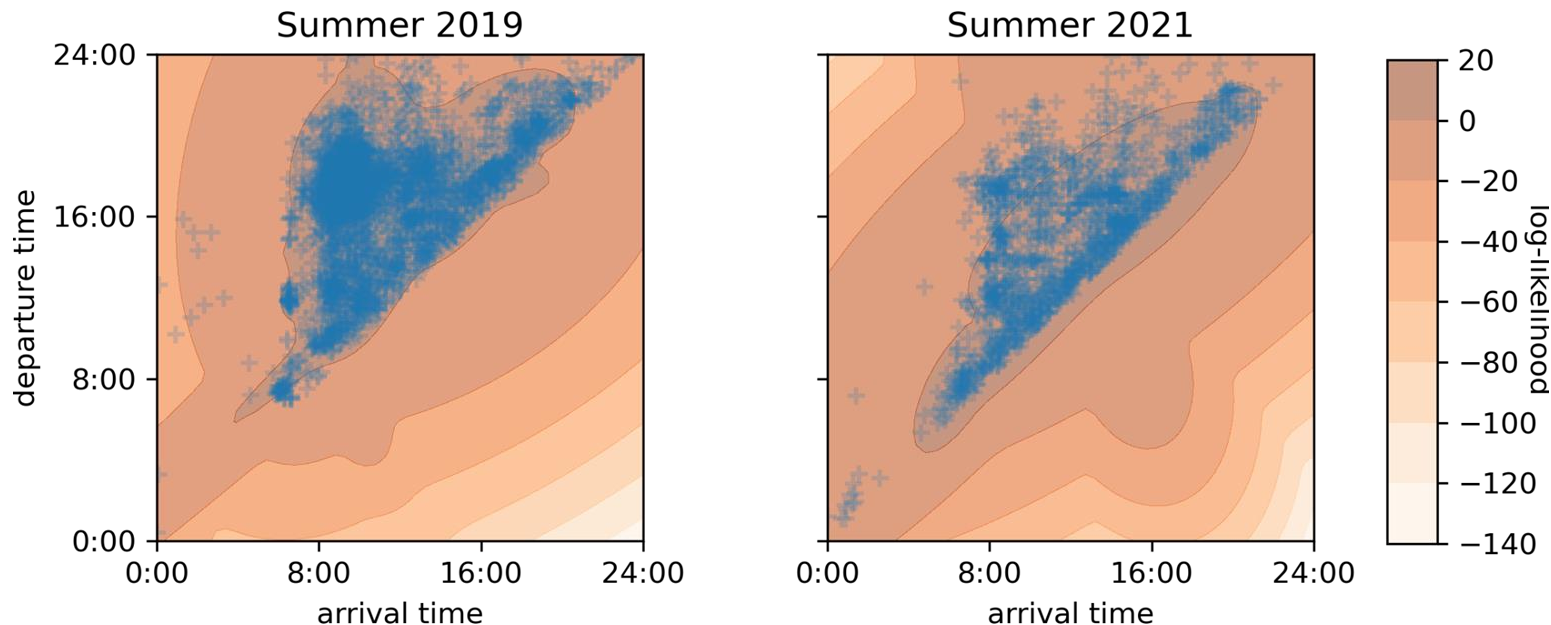

Caltech
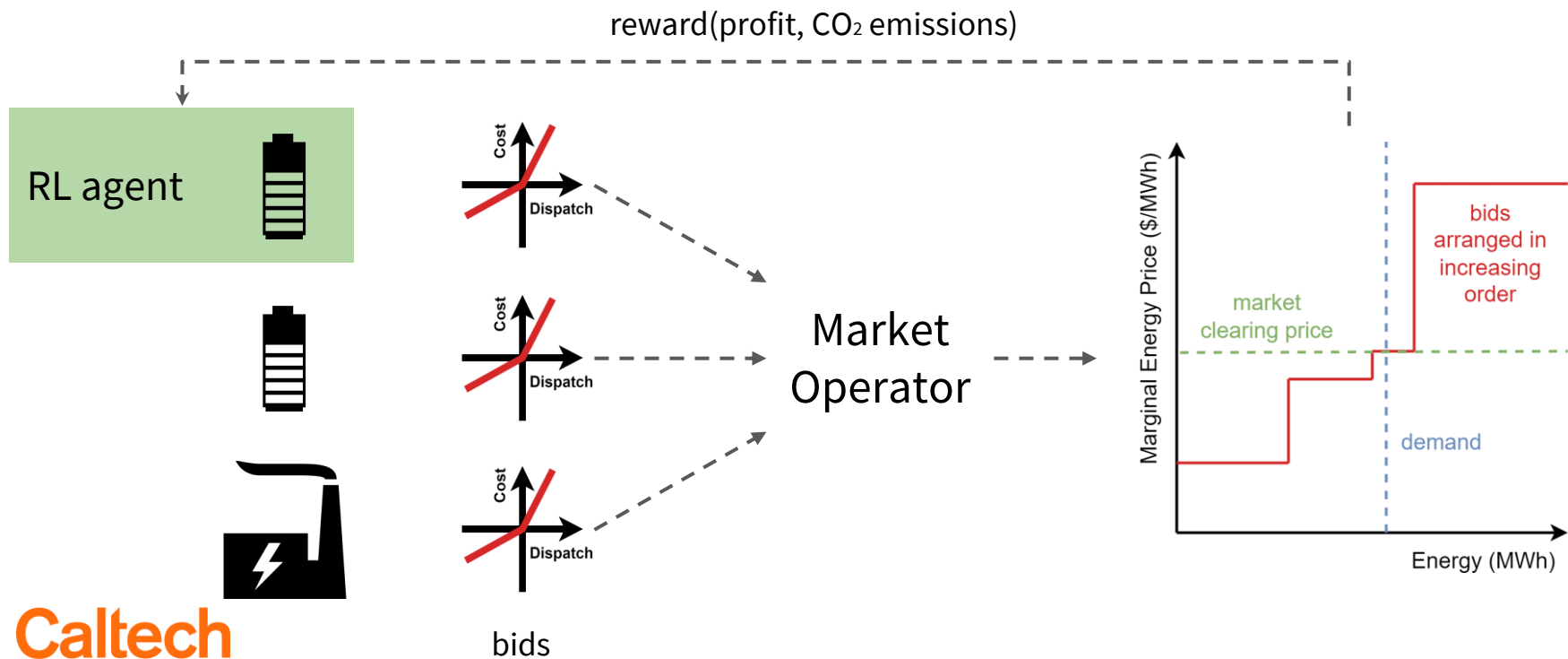*ACN-Data* + *ACN-Sim*

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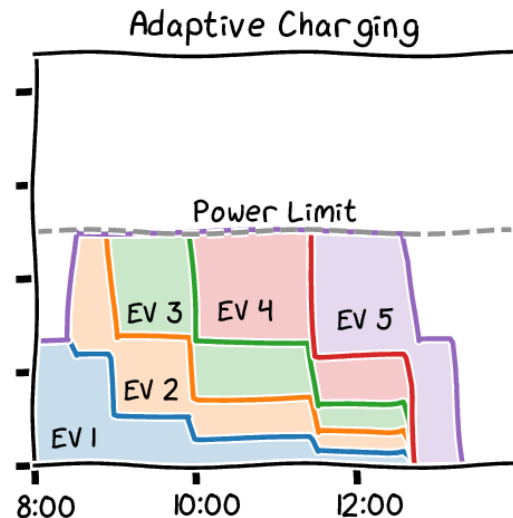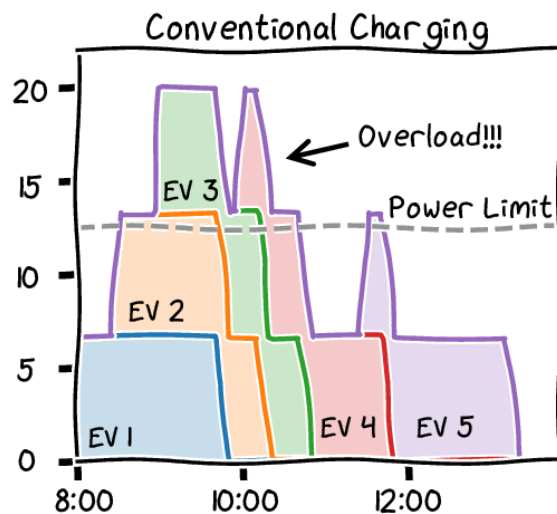
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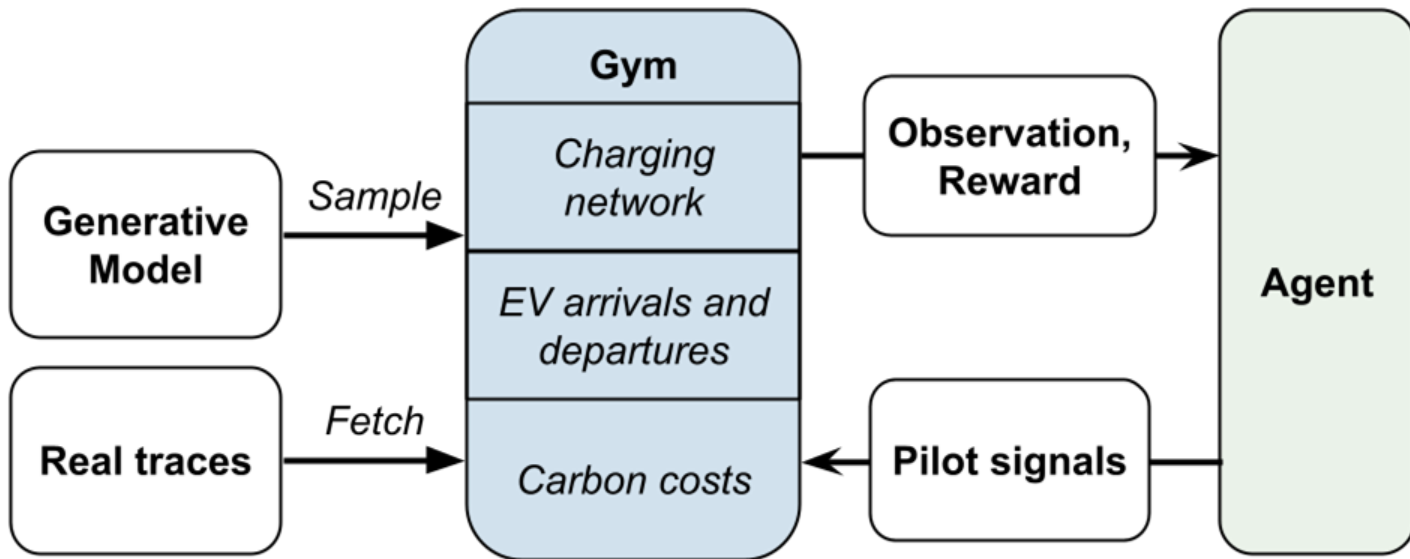
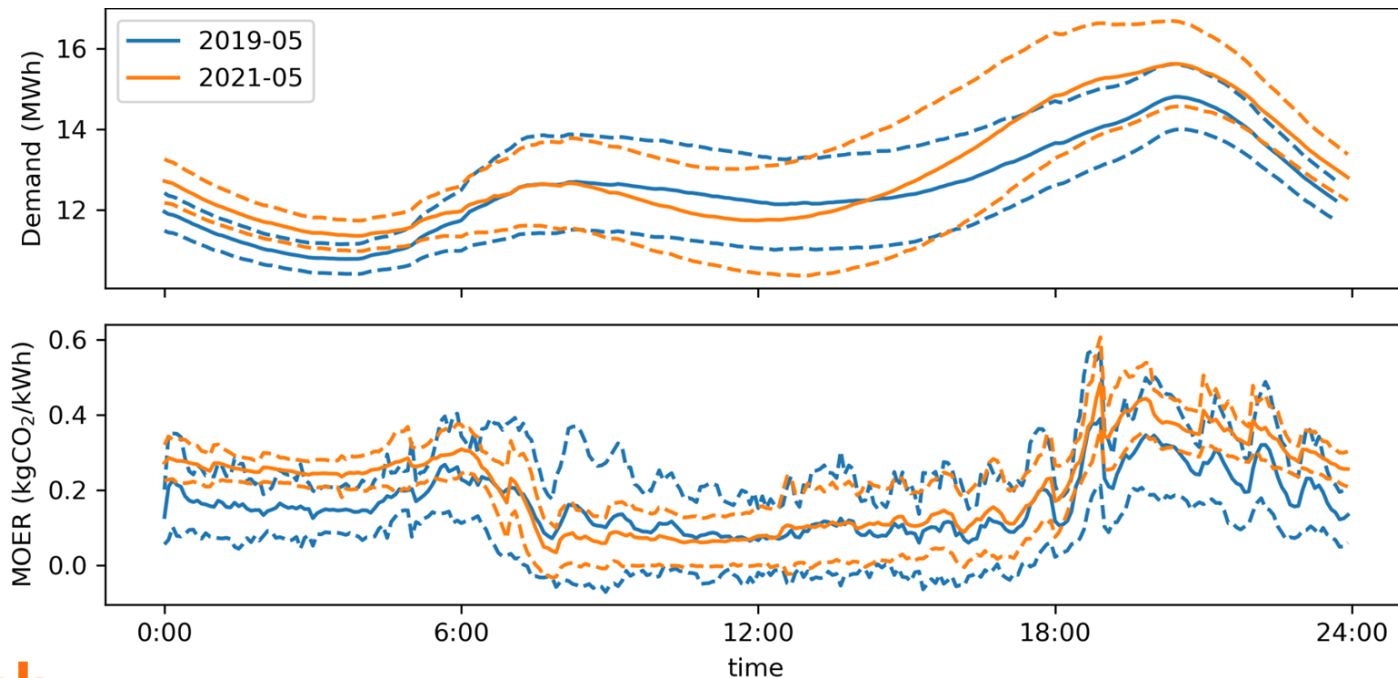# EVChargingEnv features distribution shifts in EV charging data.

`ElectricityMarketEnv` **simulates battery systems and generators bidding into a real-time market.**

reward(profit, CO_2 emissions)

RL agent

Market Operator

bids

Marginal Energy Price ($/MWh)

bids arranged in increasing order

market clearing price
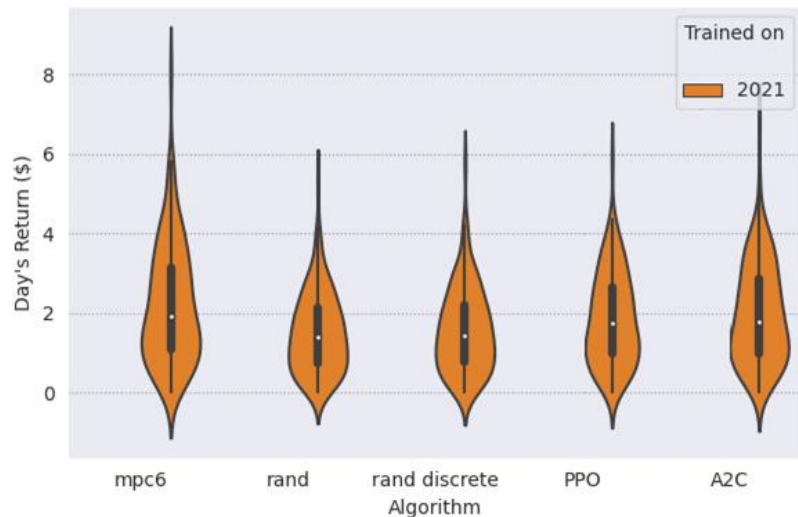
demand

Energy (MWh)

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`ElectricityMarketEnv` features distribution shifts in electricity grid data.
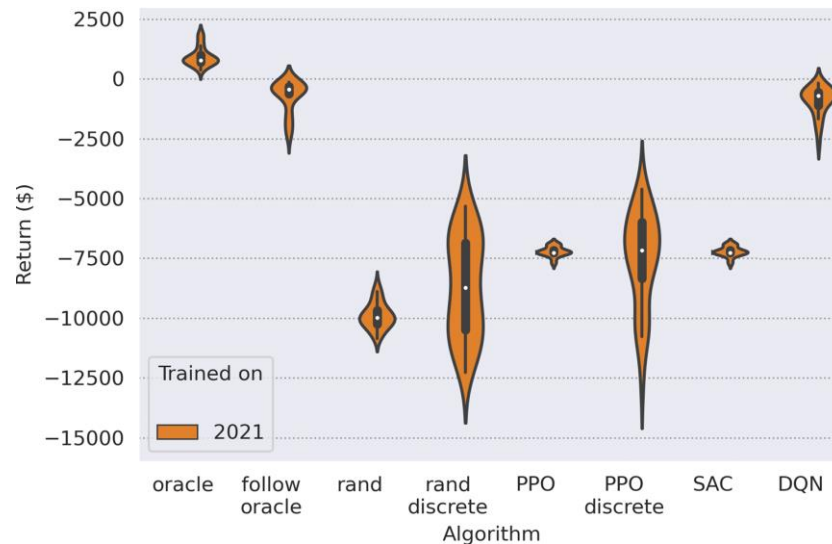
Off-the-shelf RL algorithms have significant room for improvement.
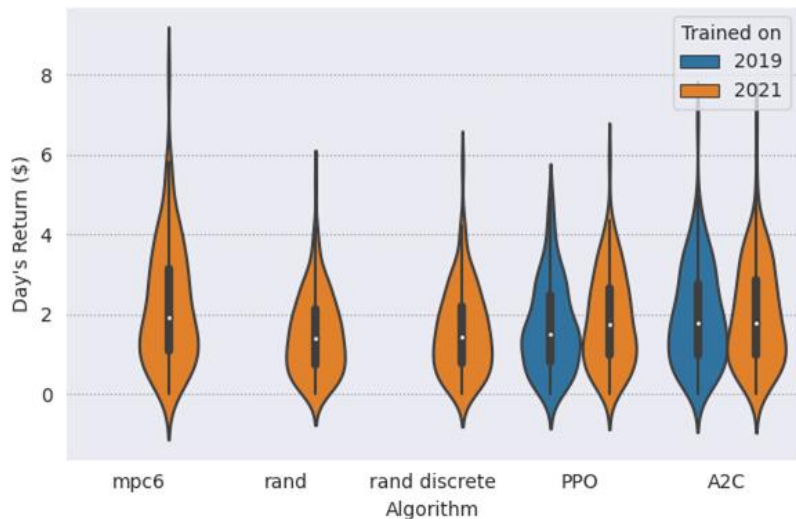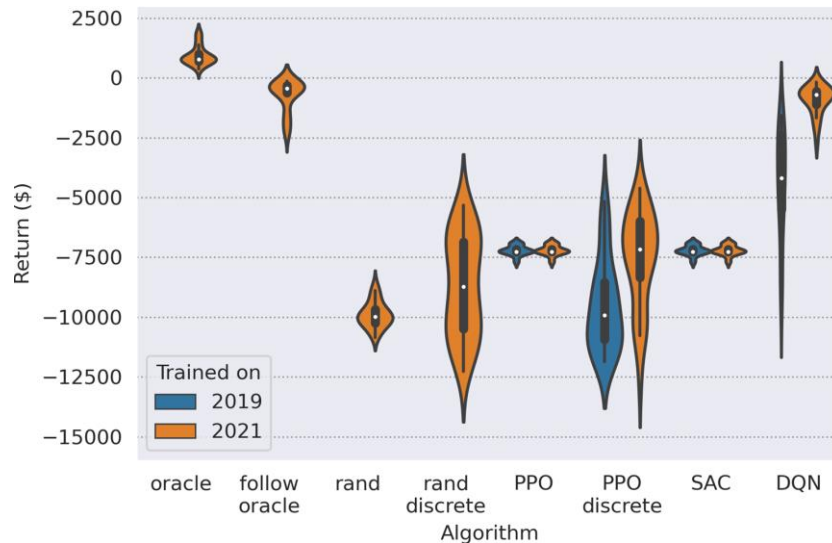

EVChargingEnv

ElectricityMarketEnv

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Off-the-shelf RL algorithms are not robust to distribution-shift.

EVChargingEnv

ElectricityMarketEnv

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SustainGym

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Under active development!

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