Clean Coalition
Making Clean Local Energy Accessible Now

TAC Campaign Q&As

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What are Transmission Access Charges (TAC)?

Transmission Access Charges (TAC) are per kWh fees for transmission usage assessed by the California Independent System Operator (CAISO) on the utilities. TAC pay for the CAISO-balanced transmission system, including investment amortization, return-on-equity for the transmission owners, and operations and maintenance of the transmission grid.

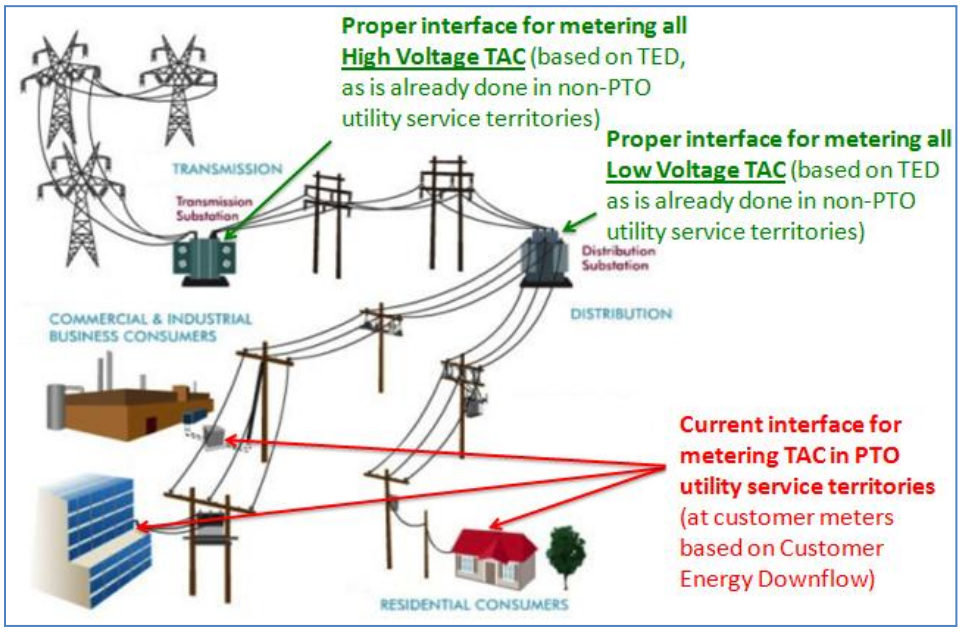
There are two distinct TAC: a universal high voltage TAC for usage of CAISO's high voltage transmission facilities (operating at or above 200 kV), and a utility-specific low voltage TAC for usage of CAISO's low voltage transmission facilities (operating at voltages lower than 200 kV). Currently, the high voltage TAC is 1.05¢ per kWh, and the low voltage TAC varies between utilities and is as high as 1.4¢/kWh. Both TAC rates are rising fast and are projected to rise much further, adding about 3¢/kWh to the levelized cost of energy over a 20-year contract. Importantly, 3¢/kWh represents more than 30% of the wholesale cost of energy in California.

How are TAC assessed?

TAC are assessed in different ways, depending on whether a utility is a Participating Transmission Owner (PTO) or not. For example, most municipal utilities are non-PTO utilities, in which case CAISO properly assesses TAC based on Transmission Energy Downflow (TED), the amount of energy down-converted from the high voltage grid to the low voltage transmission grid and from the low voltage transmission grid to the distribution grid. Transmission Energy Downflow is metered at all applicable substations. Assessing TAC on Transmission Energy Downflow means that ratepayers appropriately pay TAC on each kWh of energy delivered through CAISO's transmission system.

In contrast, California utilities that own part of California's transmission grid (i.e., PTO utilities) are inappropriately assessed TAC based on Customer Energy Downflow measured at customer meters. Customer Energy Downflow is the aggregate of customer energy usage measured by customer meters, and includes energy that was generated on the distribution grid, such as net energy metering (NEM) exports. As a result, PTOs pay TAC on every kWh delivered at the customer level, even if that energy was not delivered through the transmission system.

This graphic shows both the appropriate metering points used for non-PTO utilities and the inappropriate metering points currently used for PTO utilities:



What is wrong with the current TAC treatment?

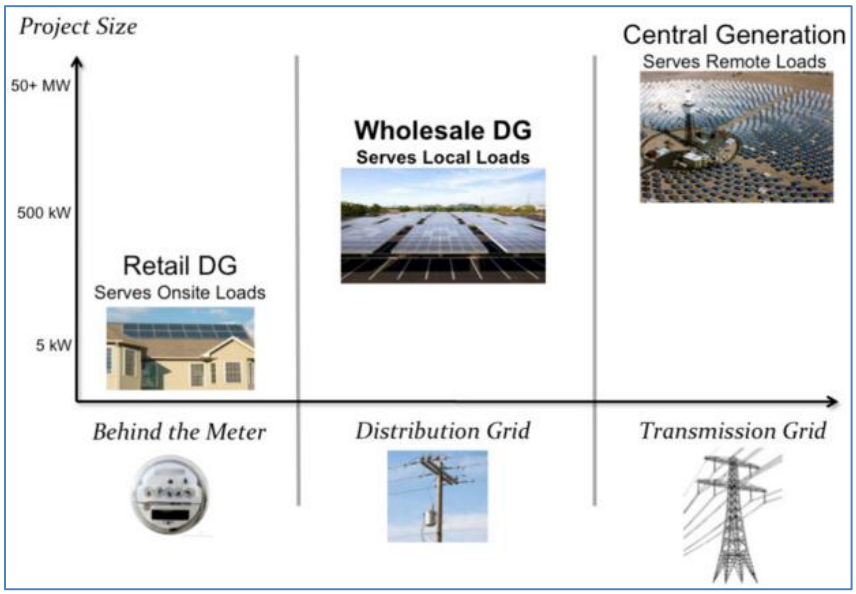
To align costs and benefits, TAC should only apply to energy that is delivered through the transmission system. Therefore, TAC should be calculated based on Transmission Energy Downflow metered at the applicable substations, where energy down-converts from the high voltage to low voltage transmission grid and from the low voltage transmission grid to the distribution grid.

The current TAC assessment on every kWh of Customer Energy Downflow, instead of Transmission Energy Downflow, creates a major market distortion. The avoided TAC associated with distributed generation and NEM exports are denied to these local energy generators and the PTO utilities and their ratepayers alike. Most importantly, local generation is denied fair market competition, and communities lose the economic, environmental, and resilience benefits of local energy development.

What is wholesale distributed generation (WDG)?

WDG refers to small energy resources that interconnect to the distribution grid to serve local load, in contrast to large, centralized generation plants that require long-distance transmission lines to deliver electricity. WDG avoids transmission costs and inefficiencies such as line and congestion losses, keeps energy dollars close to home, and can be deployed quickly.

The graphic below shows how the WDG market segment fits between the retail distributed generation market segment (i.e., behind-the-meter or BTM, like net energy metering or NEM) and the central generation market segment, which is transmission-dependent:



For the purposes of this TAC discussion, Distributed Generation (DG) includes WDG and exports from BTM generation for example NEM customer exports, because BTM exports are delivered only through the distribution grid to neighboring local loads without using the transmission system. In PTO utility service territories, BTM exports are improperly subjected to TAC in exactly the same way as WDG.

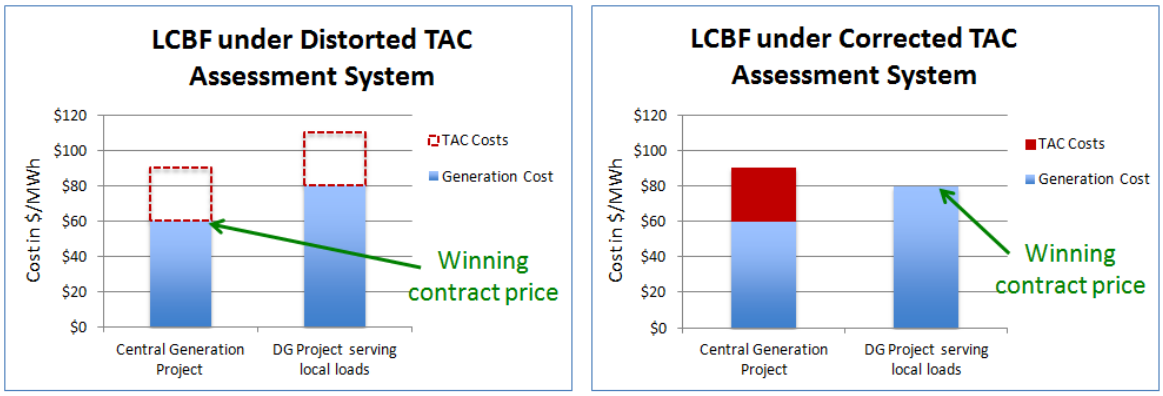
How does the Clean Coalition propose to correct the current TAC market distortion?

The Clean Coalition proposes to consistently assess TAC on Transmission Energy Downflow for all utilities, rather than inappropriately assessing TAC for PTO utilities on Customer Energy Downflow. Specifically, the Clean Coalition is seeking to amend the California Independent System Operator (CAISO) tariff language for PTO utilities to meter TAC based on Transmission Energy Downflow, aligning PTO TAC treatment with non-PTO treatment and cost causation across the CAISO balancing region. This fix will allow proper valuation of DG, including avoided TAC. Local energy should not continue to subsidize transmission infrastructure when these resources are actually reducing the need for future investments in the transmission grid.

How will the TAC solution impact energy procurement decisions?

Utilities evaluate the relative value of energy projects through a Least Cost Best Fit (LCBF) methodology. When PTO utilities like PG&E, SCE, and SDG&E apply LCBF, however, they ignore TAC because CAISO assesses TAC on Customer Energy Downflow in PTO service territories regardless of whether energy is delivered through the transmission system. As a result, LCBF only compares the relative energy generation cost, adjusted by system losses and transmission upgrades that would be paid by ratepayers.

The Clean Coalition's solution resolves this market distortion by applying equal TAC treatment to all utilities using the current TAC treatment for non-PTO utilities. The graphic below illustrates how a WDG project may have higher generation costs, but lower total delivered cost – if recognized for avoiding use of transmission:



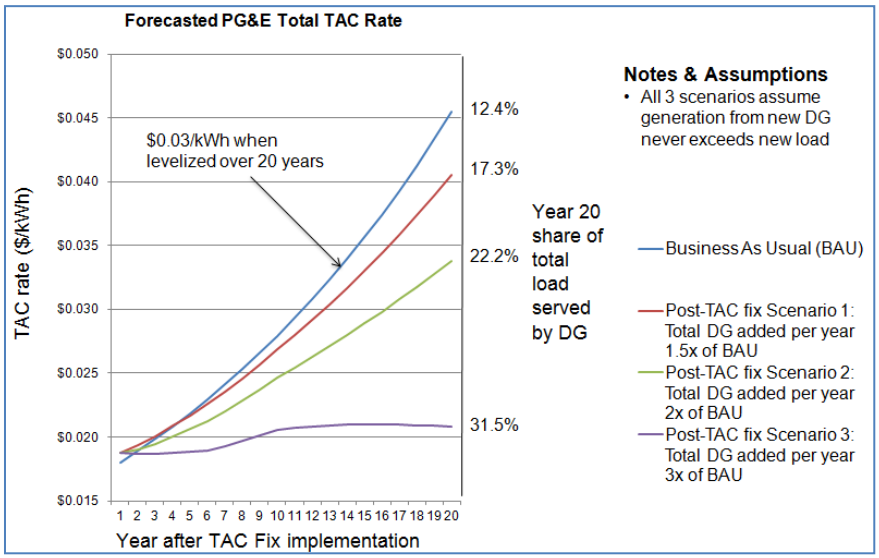
It is worth noting that distribution upgrades required to support WDG interconnection are always paid by project developers, whereas transmission upgrades required by centralized generation are always paid by ratepayers. This additional layer of hidden costs further distorts the true relative value of WDG compared to centralized generation.

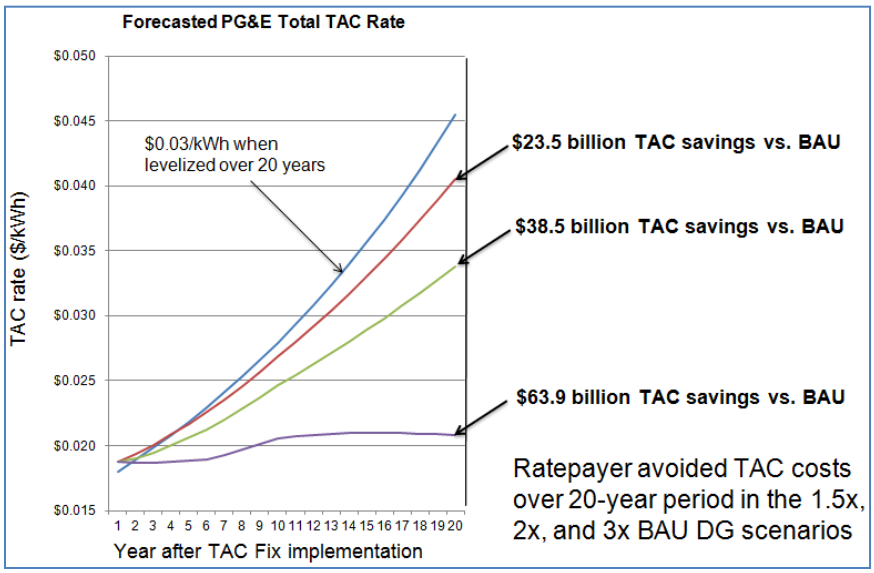
What is the Transmission Revenue Requirement (TRR)?

The TRR is the total annual revenue needed to pay for CAISO-controlled transmission grid facilities, including amortization of transmission investments, guaranteed return-on-equity for transmission owners (i.e., PTOs), and operations and maintenance associated with the transmission grid. CAISO recovers the TRR by assessing TAC on all utilities that use the CAISO transmission system.

How would the TAC correction impact the TAC over time?

Eliminating the TAC market distortion will result in increased deployment of DG and avoiding subsequently unnecessary investments in transmission infrastructure that result in substantial avoided transmission costs for all ratepayers. As a result of increased levels of WDG and reduced levels of transmission investments, TAC rates will not grow as quickly and can even decline as existing assets depreciate, saving California ratepayers over $30 billion over 20 years in the most likely scenario (the middle one) illustrated in the TAC charts below. The first chart shows the large reductions in TAC rates achieved over 20 years by eliminating the TAC market distortion and increasing use of DG. In the second chart, the area between the blue curve and the other curves represents avoided ratepayer transmission costs over the 20-year period.





What is FERC Order 1000 and why is it relevant to TAC?

FERC Order 1000 requires all regional transmission operators to use a principles-based approach to allocating transmission costs, ensuring that costs are roughly commensurate with estimated benefits and that costs are not allocated involuntarily to ratepayers who do not benefit. Under these principles, it is reasonable and appropriate for shared transmission costs to be assessed in proportion to measured usage of the transmission system (the "Usage Pays" principle).

The proposed TAC fix would align CAISO's TAC treatment with FERC Order 1000 principles by ensuring that only actual usage of the transmission system is assessed TAC. FERC Order 1000 principles are already appropriately applied in non-PTO utility service territories, but in PTO territories the current method of assessing TAC based on Customer Energy

Downflow improperly creates a TAC liability for energy produced by DG that do not use the transmission system.

Is the TAC Campaign related to the CAISO expansion?

The TAC Campaign developed independent of the CAISO expansion, but the Clean Coalition proposal could easily be applied to the super high voltage transmission grid that is currently under consideration for the CAISO expansion. To align costs and benefits for use of a super high voltage transmission system, the Clean Coalition proposes that costs for building and maintaining such a system be spread amongst usage of those transmission lines based on Transmission Energy Downflow from the super high voltage transmission grid to the high voltage transmission grid. This would ensure that after CAISO expansion, the Usage Pays principle applies equitably to each level of the CAISO system in a simple, fair, and consistent manner.

Would more WDG solar reduce peak Transmission Energy Downflow?

Yes, local solar resources reduce peak Transmission Energy Downflow, which occurs during daylight hours, and therefore slows or avoids the need for additional transmission capacity investment. For example, CAISO's peak load for 2015 was September 10th at 4:53pm, when local solar resources were producing energy to help meet the peak Transmission Energy Downflow, although not operating at peak capacity. For example, a typical 1 MW west-facing rooftop solar installation in Burbank, California would produce 514 kW on a typical September 10th day at 4pm, and 354 kW at 5pm. Peak loads typically occur during the months of July and August when solar generation would be greater, but WDG and NEM systems can reduce peak Transmission Energy Downflow even when producing at only a fraction of nameplate capacity. As California develops a new Integrated Resource Plan, Time-of-Use (TOU) customer billing, and Integrated Distributed Energy Resources programs, the state will increasingly realize opportunities to align loads with the generation profiles of solar resources.

Also, it is worth noting that the current TAC structure does not include any demand-related components related to peak load. Rather, it is entirely based on a per kWh fee for transmission usage, regardless of whether the usage occurs during peak demand or not. As a result, utilities with different Customer Energy Downflow profiles will pay the same amount of total TAC, even if one uses all its energy during off-peak hours.

Would the Clean Coalition's TAC solution result in stranded transmission assets?

No. Changing how TAC is assessed would never result in stranded transmission costs, because CAISO guarantees that transmission investments are recouped at a defined return-on-equity through the Transmission Revenue Requirement (TRR). The TAC rate is the TRR divided by total kWh of usage. If usage were consistently measured via Transmission Energy Downflow as the Clean Coalition proposes, the TRR numerator would remain unchanged, but initially would be spread across a slightly smaller (about 4%) denominator, so that the TAC rate would increase by a similarly slight amount (about 4%). However, total aggregated TAC payments would still equal the TRR, which does not change. As

always, the TRR would be fully recovered, and there is no scenario in which the change in TAC measurement would lead to stranded transmission costs.

Changing how TAC is assessed would also not cause existing transmission facilities to be abandoned or underutilized. DG currently amount to about 4% of the energy provided by utilities, according to the most recent utility filings in the CPUC's Distribution Resources Planning proceeding. Although increased reliance on local generation will reduce the need for new transmission investments, total demand for electricity continues to increase. The Clean Coalition's analysis of ratepayer savings from its TAC solution assumes new generation from DG never exceeds new load, so transmission-dependent central generation continues to be robustly utilized by serving the current load.

Would the TAC solution cause a cost shift?

It is worth noting that the purpose of the TAC Campaign is to fix an existing cost shift whereby use of DG subsidizes transmission rates for utilities opting to procure energy that requires transmission.

Initially, it is possible that utilities would pay slightly more or less in TAC payments, depending on their relative share of Customer Energy Downflow served by DG. The maximum possible TAC cost shift is negligible, because DG currently amount to about 4% of the energy provided by utilities, according to the most recent utility filings in the CPUC's Distribution Resources Planning proceeding.

Any adjustment simply corrects current inaccuracies in accounting for each utility's contribution to transmission costs. In the future, all utilities will have clear market signals for procuring energy based on lowest total cost—opting to either procure central generation and pay TAC, or procure WDG and avoid TAC. Over time, all ratepayers will benefit from lower TAC rates resulting from reduced need for additional transmission investment.

Would the TAC solution cause a cost shift between a utility's ratepayers?

No. Initially, the total amount of transmission costs paid by ratepayers will continue to be the utility's pro rata share of the TRR. (See below the question "What is a Transmission Charges Correction (TCC)?" for additional detail on how Community Choice Aggregators (CCA) and participants in utility-sponsored local renewables programs benefit by avoiding TAC with local renewables.)

If there's no cost shift, what does change after the TAC fix?

The immediate change is that the Transmission Energy Downflow pays 100% of the TRR, not just 96.1%. In PTO utility service territories, the proportion of loads served by WDG and NEM exports would no longer be subject to TAC, and the entire CAISO balancing area will be assessed TAC simply, fairly, and consistently; in the same manner that non-PTO utilities are treated today.

The most important result of the TAC fix is that PTO utilities would not incur TAC on energy procured from DG and utilized to meet local loads, and the relative value of those resources will reflect avoided TAC. This result makes local energy much more competitive

in procurement decisions for renewable energy, as explained in the procurement question above (See "How will the TAC Campaign impact energy procurement decisions?").

Additionally, utilities that serve a high share of local load with DG will have lower TAC payments to CAISO. These changes would be negligible on Day 1 of the TAC fix because the share of DG serving local load is so small. However, the TAC fix would start a virtuous cycle of encouraging utilities to invest in more DG to reduce their TAC payments. Over time, this virtuous cycle will lead to lower TRR, because less transmission investment will be required, resulting in lower TAC rates for all utilities and lower transmission costs for all ratepayers.

The table below shows that the initial changes resulting from the TAC fix are simply accounting changes in calculating the TAC rate and kWh of transmission usage in PTO service territories (nothing changes in non-PTO service territories).

	CAISO HV TRR	Load Basis for TAC	HV TAC Rate	Total HV TAC Costs to Ratepayers
Before TAC Fix	$2.22 billion (Total 2016 PTO filings)	**211,341 GWh** (Customer Energy Downflow)	**$0.01049/kWh** (HV TAC rate = CAISO HV TRR ÷ Customer Energy Downflow)	$2.22 billion (HV TAC Rate × Customer Energy Downflow)
After TAC Fix	**Same as above**	**203,023 GWh** (Transmission Energy Downflow) = 8,318 GWh less than Customer Energy Downflow due to local DG (3.9%)	**$0.01092/kWh** ($0.00043/kWh increase, 4.1%)	**Same as above** (New HV TAC Rate × Transmission Energy Downflow) Transmission usage now pays 100.0% of TRR, not just 96.1%

NOTE: To calculate the full TAC rate, LV TAC must also be considered. LV TAC is specific to each service territory. The total LV TAC costs to ratepayers, and within each service territory, also do not change after the TAC fix.

To the extent that PTOs serve different shares of Customer Energy Downflow with Distributed Generation (which is currently minor for all PTOs – 3.9% for PG&E in 2016), fixing the TAC will result in negligible cost shifts between PTOs.

Would implementing the Clean Coalition's proposal require new metering equipment?

Yes, revenue-grade metering would need to be installed at substations. However, the total cost of implementing the Clean Coalition's proposed TAC fix is estimated to be less than $20 million: an average meter upgrade cost of less than $10,000 per substation, and fewer than 2,000 substations requiring a meter upgrade. Most importantly, the total cost of implementing the TAC fix is negligible compared to the billions of dollars in annual TRR and the tens of billions of dollars in TAC savings for ratepayers over the next 20 years. Furthermore, the communications solutions are already in place for use with the existing non-revenue grade metering hardware.

What is a Transmission Charges Correction (TCC)?

The Transmission Charges Correction (TCC) is an accounting adjustment that enables utilities to reimburse a Load Serving Entity (LSE) or a customer class that procures WDG

and/or NEM exports for avoided transmission charges. For example, when a Community Choice Aggregator (CCA) procures WDG, the Distribution Provider delivering the energy will pay a TCC reimbursement to the CCA for TAC avoided by the CCA's WDG procurement. This will be necessary only if CAISO doesn't bill the adjusted TAC to each LSE directly.

The TCC is calculated as the TAC rate multiplied by the kWh of DG the CCA uses to serve local load. The CCA then decides whether to pass the TCC value to its customers.

Do NEM exports reduce a NEM customer's Customer Energy Downflow, and therefore a PTO utility's TAC liability?

No, NEM exports (or any other exports from BTM generation) do not reduce Customer Energy Downflow for the purposes of calculating a PTO utility's TAC liability. However, since a NEM customer only pays bypassable charges, including energy, distribution and transmission components, on Net Load (Customer Energy Downflow minus NEM exports), NEM exports reduce transmission costs for all NEM customers, but never for a PTO utility, which is assessed TAC based on Customer Energy Downflow. Utilities then must distribute the transmission costs avoided by NEM customers among their entire customer base, resulting in a cost shift from NEM customers to all other customers.

The TAC fix will not increase charges on NEM customers or change NEM accounting relationships with the utility at all. Instead, it will mean that the utility is no longer charged TAC for the energy it receives from NEM customers, thereby reducing the cost (and increasing the value) of NEM customers to the utility, and reducing utility opposition to NEM.

Although NEM customers are not now impacted by TAC, they will be in the very near future. If and when NEM customers are paid for NEM exports on a wholesale price basis instead of a retail price basis, the Clean Coalition's proposed solution would allow utilities to avoid $0.03/kWh in TAC on NEM exports, increasing the value of NEM exports to utilities by 30% or more.

How far away could generation be located, and still not have to pay the TAC charge?

If the interconnection voltage is less than 200kV, then the High Voltage TAC will be avoided; and if the interconnection voltage is less 69kV or lower in the PG&E service territory, then the LV TAC will be avoided as well.

Projects under 5MW are almost always interconnected to the distribution grid, because costs associated with a transmission interconnection would overwhelm the economics of smaller projects. Projects over 20MW are almost always interconnected to the transmission grid, because the project voltages are untenable for the distribution grid. Projects sized in between will be case-by-case. The developer of a specific project will have all the details.

Once utilities are assessed the TAC charges how do they distribute these costs to their customer base?

Quoting the CAISO's TAC Issue Paper:

"Today, independent [Load Serving Entities or LSEs] that operate within an IOU service territories and use the IOU distribution systems to deliver energy to their retail customers – i.e., retail direct access electric service providers (ESPs) and community choice aggregators (CCAs) – have the option of performing the retail billing themselves or utilizing the retail billing services of the IOU utility distribution company (UDC) in whose territory they operate. In either case, as well as for an IOU LSE, the LSE's scheduling coordinator (SC) provides the end-use metered load data to the ISO for settlement purposes.

If the non-IOU LSE performs its own retail billing, the ISO assesses TAC to the SC for the LSE commensurate with the end-use metered load data. The LSE then recovers the TAC costs from its retail customers. As long as the billing determinants used at wholesale and retail are the same, the LSE does not have any surplus or shortfall between what it collects from retail enduse customers and what it pays to the ISO. If, however, the ISO changes its billing determinant and the CPUC does not change the retail rate structure to be consistent, then the LSE could have a surplus or shortfall.

Alternatively, if the non-IOU LSE uses the IOU UDC billing service, the ISO assesses TAC to the SC for the UDC and the UDC collects the retail transmission charge from customers. In contrast to the previous case, in this case any shortfall or surplus resulting from a difference in the wholesale and retail rates and billing determinants will fall on the UDC rather than the LSE. If such surplus or shortfall is related to LSE procurement practices, however, the UDC will presumably need to redistribute the surplus or shortfall to the LSEs appropriately."

In what form does a customer (commercial or residential building) see these TAC charges that the utilities accrue? What does it look like on their energy bills?

TAC charges are a component of the "Transmission & Distribution" portion of every customer's electricity bill.

If the TAC Campaign is successful, will it have any obvious benefits towards the deployment of microgrids?

Yes, particularly for multi-customer microgrids. Currently, TAC is assessed differently for single-customer microgrids and multi-customer microgrids. Electricity customers participating in multi-customer microgrids pay TAC on local energy consumed, whereas single-customer microgrids do not because all generating DERs are behind the meter of the single customer. By setting the TAC billing determinant at the Transmission Energy Downflow, multi-customer microgrids would not incur TAC charges on energy generated locally, effectively lowering the cost of operating their microgrid.

For more details, see comments submitted by the Microgrid Resources Coalition in support of the Clean Coalition's TAC fix proposal.

What is currently happening with the campaign? Your website lists that CAISO released a TAC issue paper in June, what happens next?

The ball is currently in CAISO's court, as they have not yet issued a schedule for the stakeholder initiative covering this issue. Stakeholders submitted comments about the CAISO issue paper on June 30. The Clean Coalition has requested that CAISO issue a statement clarifying key facts in the issue, as many parties disagree on important issues in the campaign, including current TAC billing practices. The Clean Coalition worked with CAISO directly to identify the TAC methodology and billing process and is therefore looking to CAISO for leadership in explaining current practices.

While awaiting CAISO's next steps, the Clean Coalition is drafting a statement to its supporters in response to the arguments made by stakeholders opposed to the Clean Coalition's proposal. In addition, the Clean Coalition continues to identify and rally supporters to maintain the pressure to resolve the market distortion on distributed generation.