ASC 2026 SOLAR CAR COMPETITION

MULTI-OCCUPANT VEHICLE SCORING AND STRATEGY

IEF Solar Car Conference, 01/18/2025

Presented By Head MOV Inspector

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MOV AGENDA TOPICS

Scoring History

Upcoming Event Scoring

MOV Practicality

The “Optimization” Score

Scrutineering Lessons Learned

Metered Charging

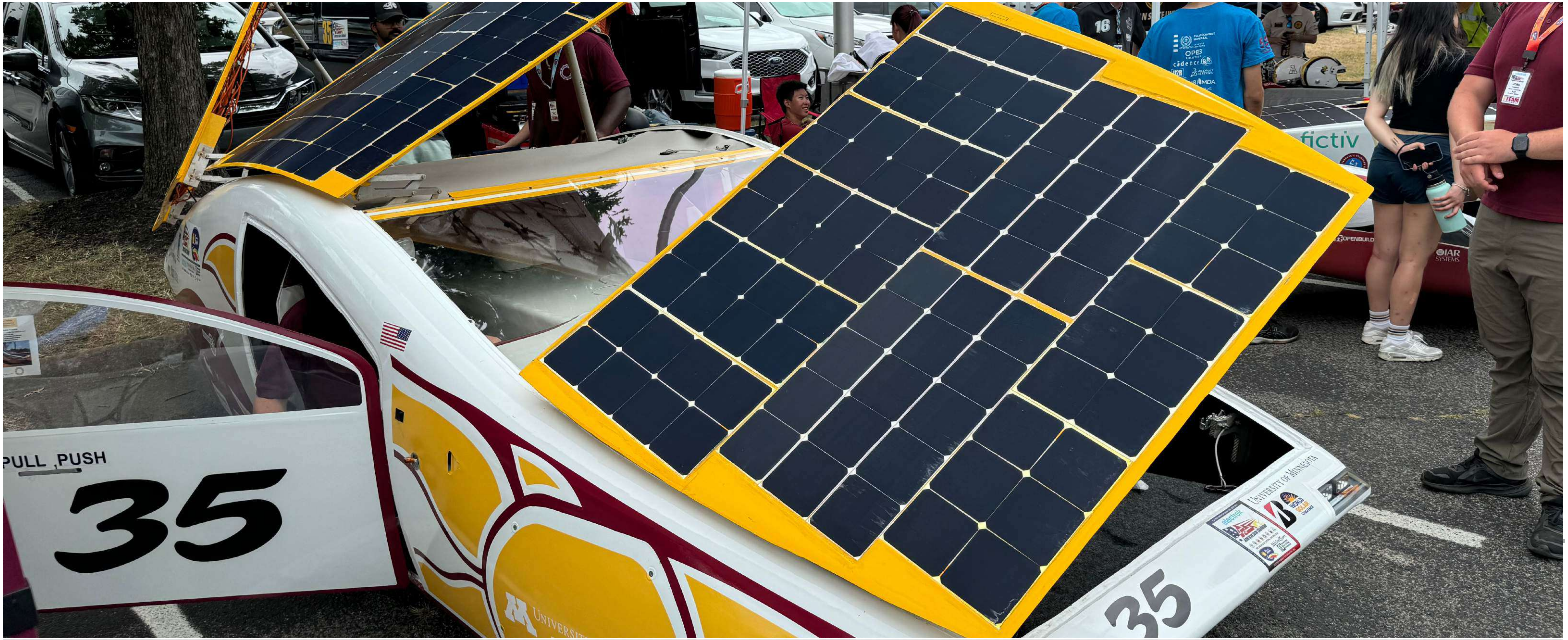
MOV Strategy

Open Discussion and Q&A

THIS CONTENT IS INTENDED TO SUPPLEMENT THE REGULATIONS BUT DOES NOT SUPERSEDE THEM

DISCLAIMER

ASC 2026 Rev A Regulations are Referenced in this Document



SCORING HISTORY

ORIGIN OF THE MULTI-SEAT SOLAR CAR CLASSES

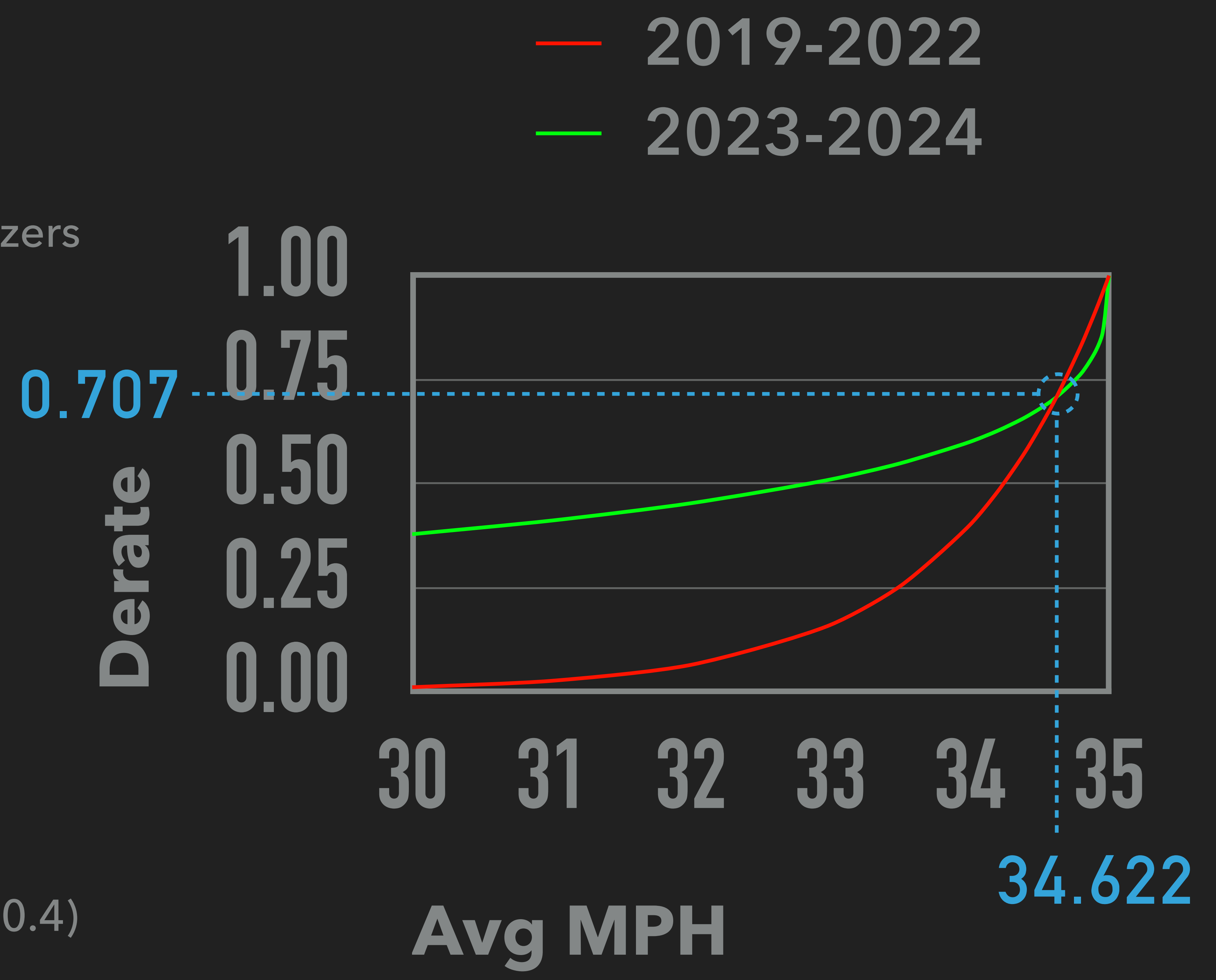
- Some solar car teams wanted to make increasingly practical vehicles that more closely resemble production automobiles
    - They felt the existing solar car competition regulations were holding them back
    - Pioneering teams like Bochum (WSC) and Minnesota (ASC) began to build two seat vehicles before their was an official competitive class for this type of solar car
- WSC reacted by creating a separate solar vehicle class and eventually ASC followed suit
    - Vehicle designs must accommodate at least two occupants with grid energy assistance
    - Emphasis on practicality and external energy efficiency in addition to going fast
    - Cruiser and MOV classes provide a greater challenge for vehicle design/manufacturing and operational strategy with multi-variable scoring optimization required
    - More teams are getting into these classes because they enjoy the new challenge and are interested in building vehicles that have looks and features closer to production cars

HISTORY OF WSC CRUISER SCORING

- WSC introduced the Cruiser class in 2013; first two events were scored as weighted sum categories (limited battery weight)
  - **2013:** 3*Time + External Energy + Practicality + 0.3*Person-km (categories weighted ~ 56.6%, 18.9%, 18.9%, 5.7% respectively)
    - External energy grid charging allowed at Tennant Creek, Alice Springs, and/or Coober Pedy (each charge assessed as nominal battery capacity)
  - **2015:** 70%*Time + 15%*External Energy + 10%*Practicality + 5%*Person-km (increased weight for time and decreased for grid energy/practicality)
    - External energy grid charging allowed at Alice Springs only (charge assessed as nominal battery capacity)
  - Each category normalized based on the best performance in that category of any finishing Cruiser team
  - Penalties added to competition time
- WSC simplified the Cruiser weighted sum category terms in 2017 by introducing energy efficiency scoring (unlimited battery size)
  - **2017:** 80%*Person-km External Energy Efficiency + 20%*Practicality (increased weight for practicality)
    - Allowed external energy recharging at any time except during control stop time (each charge assessed as nominal battery capacity)
    - Each category normalized based on the best performance in that category of any finishing Cruiser team
    - Penalties deducted from the relative external energy efficiency score
    - Introduced target finish times that Cruiser teams had to arrive within to be scored (average speed/arrival time is the most critical factor for this event)
- Two most recent events eliminated weighted sum categories in favor of multiplying energy efficiency, practicality, and derate scoring (unlimited battery capacity)
  - **2019 & 2023:** Person-km External Energy Efficiency*Practicality*Derate
    - AC metered external energy grid charging allowed at Tennant Creek and Coober Pedy only (using organizer supplied EVSE)
    - Scores are no longer normalized based on the performance of other teams
    - Final score is derated 1% for each penalty demerit point received and each minute late that the team finishes

HISTORY OF ASC MOV SCORING

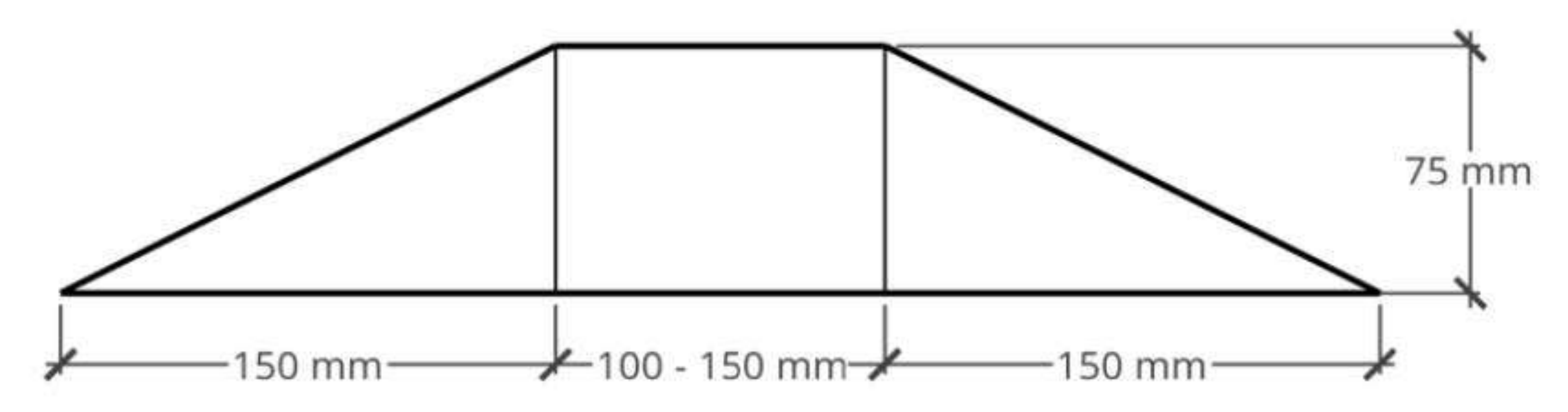
- ASC introduced the MOV class in 2018 with scoring based on weighted sum categories (unlimited battery weight)
  - **2018:** 80%*Person-km External Energy Efficiency + 20%*Practicality (modeled after WSC 2017)
  - Allowed external energy recharging at any time (each charge assessed as nominal battery capacity)
  - Each category normalized based on the best performance in that category of any finishing MOV team
  - Penalties added to elapsed time (makes it harder to plan target speed to finish within the elapsed time window)
  - Enforced a target elapsed time derate on the energy efficiency score (incentivizes teams to drive faster to finish as early as possible within the window)
    - MOV teams must complete the route without trailering before the target elapsed time window closes in order to get an energy efficiency score
- ASC introduced distance based scoring and a unique MOV scoring formula in 2021 that remained largely untouched through 2024 (unlimited battery capacity)
  - **2021, 2022, & 2024:** Person-mi External Energy Efficiency*Completion*Speed Derate*Practicality
  - External energy charging allowed at any time except while serving mandatory hold time
    - External energy charging can be measured via an onboard AC energy meter provided by the organizers
  - Completion factor normalized based on the highest distance driven of any MOV team
    - Penalty deductions are applied to distance driven in the Completion factor
  - Person-mi metric used instead of Person-km
  - 35MPH target speed enforced for the Tour
    - Incentivizes teams to average as close as possible to 35MPH without going under
    - In order to fairly evaluate efficiency between teams they need to be driving similar speeds
    - After 2022 the derate changed from 0.4^(Target MPH - Avg MPH) to 0.6^((Target MPH - Avg MPH)^0.4)



UPCOMING EVENT SCORING

WSC CRUISER VEHICLE DESIGN CHANGES FOR 2025

- 55MJ (~15.28kWh) battery capacity limit (reduced from unlimited)
- Max vehicle dimensions up to L=5.8m, W=2.3m, H=1.65m (increased from L=5m, W=2.2m, H=1.6m)
  - Cargo compartment must be separate from mechanical/electrical systems and accommodate two luggage containers (0.56m × 0.36m × 0.23m each)
- Unlimited solar collector area allowed within max vehicle dimensions (increased from 5 square meters)
  - Vehicle must be designed to be powered by renewable energy but can also recharge from the grid
- Vehicle must be supported by at least 3 wheels (decreased from 4 wheels)
- The front/rear vehicle overhang from the closest tire contact patch must be at min 60% of the wheelbase
- The car must be able to drive over a predefined speed hump with only tires touching the hump (replaces the previous 100mm ground clearance requirement)



WSC CRUISER OPERATIONS/SCORING CHANGES FOR 2025

- Cruiser design judging now takes place at the start in Darwin instead of the finish in Adelaide
- Scoring is simplified to match Challenger class (the team that completes the route with the earliest finish time wins)
  - Design scores set the Darwin start order & release hold times from the Katherine control stop
    - Design scores are normalized based on the highest design score of any team
    - A design score of 0 results in a 5 hour hold compared to no hold for a design score of 1
  - Penalties are added to competition time
- Cruiser teams may fully recharge their battery from the grid between each day of driving
  - Once they start a day of driving, they may not grid charge until they finish driving that day
  - External charging is not metered and teams must use their own EVSE and energy sources
- Cruiser cars must have at least two seats and carry exactly two occupants whenever driving

THE DILEMMA OF USING EFFICIENCY AS A SCORING METRIC

- There is desire among teams and officials to use external energy efficiency as a scoring metric to keep the MOV class from effectively becoming an EV competition
- The problem is that slower driving is always more efficient
  - Energy usage increases with the square of velocity
  - It is unfair to directly compare the efficiency of vehicles traveling at different speeds
- How can we ensure that teams are able to finish the event if they are primarily concerned with external energy efficiency?
  - 2017-2024 events have used scoring derate equations that result in a significant number of Cruiser/MOV teams obtaining a zero or near-zero score despite a respectable effort/performance in the overall competition
  - These scoring formulas have incentivized teams to operate just above the point of failure in an attempt to complete the event which is not desirable for the competition

ASC MOV VEHICLE DESIGN CHANGES FOR 2026

- **8.2.A.2** - 15.5kWh battery capacity limit (reduced from unlimited and inclusive of the WSC 2025 55MJ limit)
- **8.12** - Can now use NACS plug/receptacle or J1772
  - J1772 is currently more common for Level 1/Level 2 chargers but NACS will eventually surpass it as more North American automakers start to ship vehicles with a NACS receptacle
- **9.1** - Max vehicle dimensions up to L=5.8m, W=2.3m, H=1.65m (matching WSC 2025)
- **9.4** - Removed the requirement for Daytime Running Lights (DRLs)
- **10.2.A.1** - Reduced minimum number of wheels in contact with the ground from 4 to 3 (matching WSC 2025)
- **8.4.B** - Added G Loading considerations for battery enclosure mounting
- **9.8.B** - Eliminated the egress opening outline requirement
- **10.3.A.12** - Front roll cage elements must be angled at least 15 degrees backwards from vertical
- **10.7.C** - Turning radius requirement reduced from 16m to 15m (matching WSC 2025)
- **10.9.E** - Acceleration test (hill climb ability) added to Dynamics Scrutineering
  - Solar cars will be required to drive 18m from a standing start within a specified amount of time
    - Time requirement is currently TBD and will be set following the FSGP 2025 competition

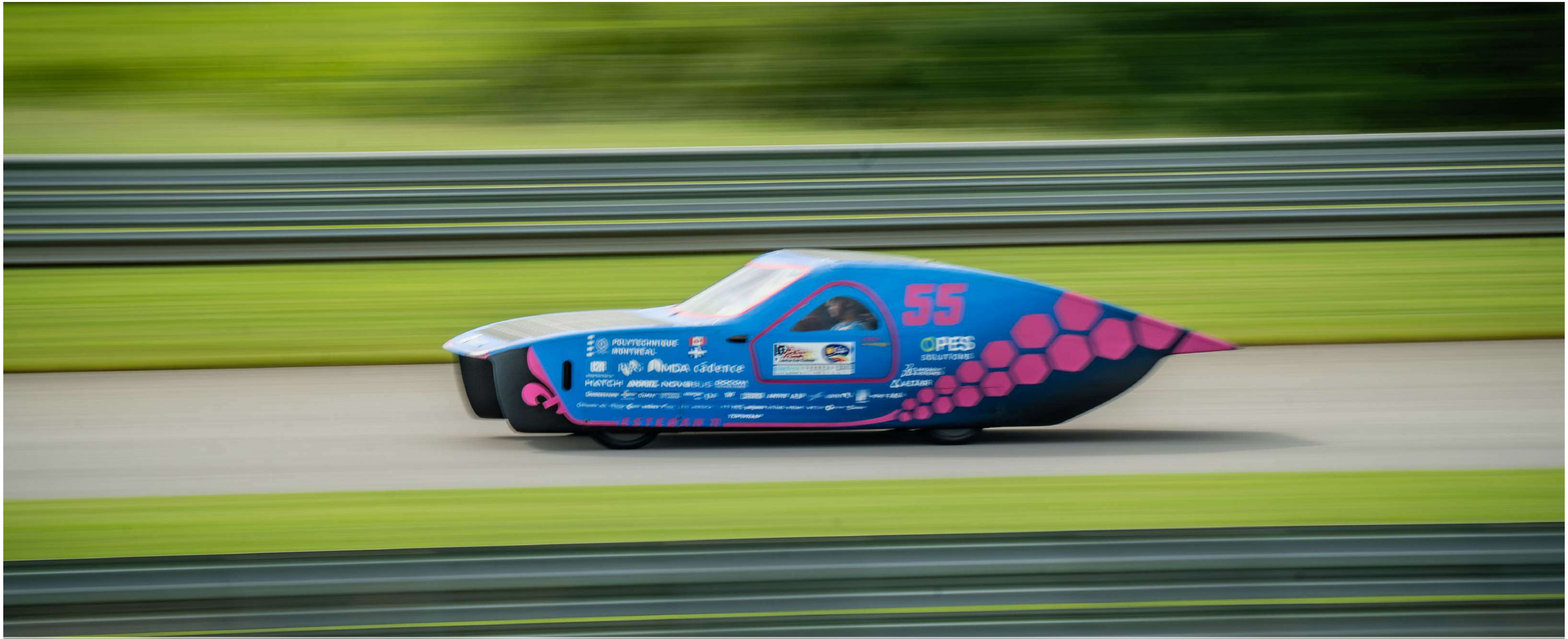
ASC MOV OPERATIONS/SCORING OVERVIEW FOR 2026

- **8.1.H** - Spraying water on the solar collector is no longer allowed between battery un-impound in the morning and battery impound in the evening
- **12.2.A** - Any team that fails to complete the Base Route of the Tour will automatically be ranked below all teams that successfully complete it
- **13.2** - We are back to scoring based on weighted sum categories
    - 40%*Official Distance + 40%*Optimization + 20%*Practicality
    - Each category normalized based on the best performance in that category of any finishing MOV team
    - Deductions are applied to distance driven to arrive at Official Distance
- **13.2.B** - Optimization Score = (Average Occupancy x External Energy Efficiency) ^ (1/3)
    - **13.2.C** - Occupancy is determined for each Segment of the Tour or each Official FSGP Lap based on the minimum number of occupants carried during that segment/lap
    - **13.2.E** - External Energy Efficiency is event distance driven divided by external energy usage
        - **12.18** - External energy charging is allowed at any time except while serving mandatory hold time
        - **8.12** - External energy charging can be measured via an onboard AC energy meter provided by the organizers
    - The ^(1/3) power is to ensure distance driven is prioritized over the optimization score
        - You will not come out ahead if you drive slow in an attempt to maximize your optimization score
- **13.2.H & 13.2.I** - For FSGP and ASC stage ranking, Practicality is omitted and the weighting of the normalized categories changes as follows:
    - 50%*Official Distance + 50%*Optimization
    - For ASC stage ranking, external energy efficiency will be cumulative from the start of the event but all other values will be for the single stage
- **13.3** - All practicality features must remain intact throughout the cross country Tour

MOV PRACTICALITY

ASC MOV PRACTICALITY SCORING FOR 2026

- **13.2.G.1** - Teams must submit a "window sticker" for their solar car to ASC Headquarters on the morning of practicality judging
- **13.2.G.3** - Practicality judging is conducted on the solar cars during the rest day before the start of ASC
  - The score from each judge is averaged into the overall practicality score ranging from 0-100%
- **13.2.G.4** - The judging rubric will not be released to judges or teams until the morning of practicality judging
- **13.2.G.5** - Prior to the Tour, teams will receive their own score but practicality scores of all teams are not published until the ASC awards ceremony
- **13.2.G.2** - Judging is based on a mix of subjective and objective evaluations in the following areas:
  1. Comfortable occupant seats that are easy to get in and out of
  2. Occupants are able to access a cup holder, sunglasses holder, and USB port while buckled into their seat
  3. Ergonomic steering wheel with easy to operate turn signals, horn, and other controls
  4. Clear driver visibility with wide field of view, good rearview camera view, and functional sun visors
  5. Easy to use vehicle infotainment system with good audio quality and bluetooth phone connectivity for music and navigation
  6. Spacious dedicated cargo area(s) separated from the occupant cabin, wheel wells, and vehicle electronics
  7. Occupant and cargo access doors that are well secured and easy to open/close from inside and outside
  8. Stylish interior with a good fit and finish
  9. Stylish exterior with a good fit and finish
  10. Overall vehicle desirability based on window sticker and in person vehicle evaluation
- Questions and thoughts on the future of MOV practicality?



THE “OPTIMIZATION” SCORE

EVOLUTION OF MOV/CRUISER NOMINAL CAPACITY (Q) CALCULATION

- WSC 2013
  - Ratio of total mass of battery cells divided by the allowable mass of the cells based on the battery chemistry used [unit less]
- WSC 2015
  - 15kWh multiplied by total mass of battery cells divided by the allowable mass of the cells based on the battery chemistry used [kWh]
- WSC 2017, ASC 2018, WSC 2019, and WSC 2023
  - Total mass of battery cells multiplied by organizer specified gravimetric energy density based on battery chemistry used [Wh]
- ASC 2021, ASC 2022, ASC 2024, and ASC 2026
  - Total energy capacity of battery cells based on supplier data sheet [kWh]
- WSC 2025
  - Total energy capacity of battery cells based on supplier data sheet [MJ]

EVOLUTION MOV/CRUISER MAX SOLAR COLLECTOR AREA (SILICON)

- WSC 2013 and WSC 2015
  - 6 square meters
- WSC 2015, WSC 2017, ASC 2018, WSC 2019, ASC 2021, ASC 2022, WSC 2023, ASC 2024, and ASC 2026
  - 5 square meters
- WSC 2025
  - Unlimited
- What will ASC allow in the future?
  - Likely to increase max MOV solar collector size at least to match SOV area and possibly more
    - We will reassess whether this should be accompanied by a change to the 15.5kWh battery capacity limit
    - If we find that teams are essentially able to drive the speed limit throughout full stages we will change future regs to prevent this
  - Wait and see how the 2025 and 2026 events go
    - If we see many Cruisers in WSC 2025 with larger than SOV solar area we may decide to increase our area limits to be more inclusive of international teams
    - We want a significant portion of MOV energy to come from solar but aren't convinced that unlimited solar collector area is the right move for the ASC MOV class
- Questions and thoughts on the future of MOV solar collector area?

THE NEW "OPTIMIZATION" SCORE

- The optimization score is intended to provide teams an opportunity to differentiate themselves from other teams who achieve a similar distance driven
- External energy efficiency is included so that teams have an incentive to perform morning/evening solar charging like SOVs and to guard against this becoming an EV competition
  - We will consider future restrictions on when external energy charging can occur (such as only overnight)
- ASC 2026 includes occupancy as a factor in the optimization score in order to provide tangible benefit to teams with an existing car featuring over 2 seats to run with more than 2 occupants
  - Longer term, we don't think this equation provides incentive for new MOVs to be built with more than 2 seats
    - We have been unable to devise a scoring formula that allows direct competition between teams with different numbers of occupants at significantly different average speeds without providing clear design advantage to either the min or max number of occupants
  - We will consider removing average occupancy in the future in favor of requiring a specific number of occupants at all times as WSC has done
    - 2 occupants seems to the near term consensus but perhaps the required occupants will increase someday
- Questions and thoughts on the future of the "Optimization" score?

SCRUTINEERING LESSONS LEARNED

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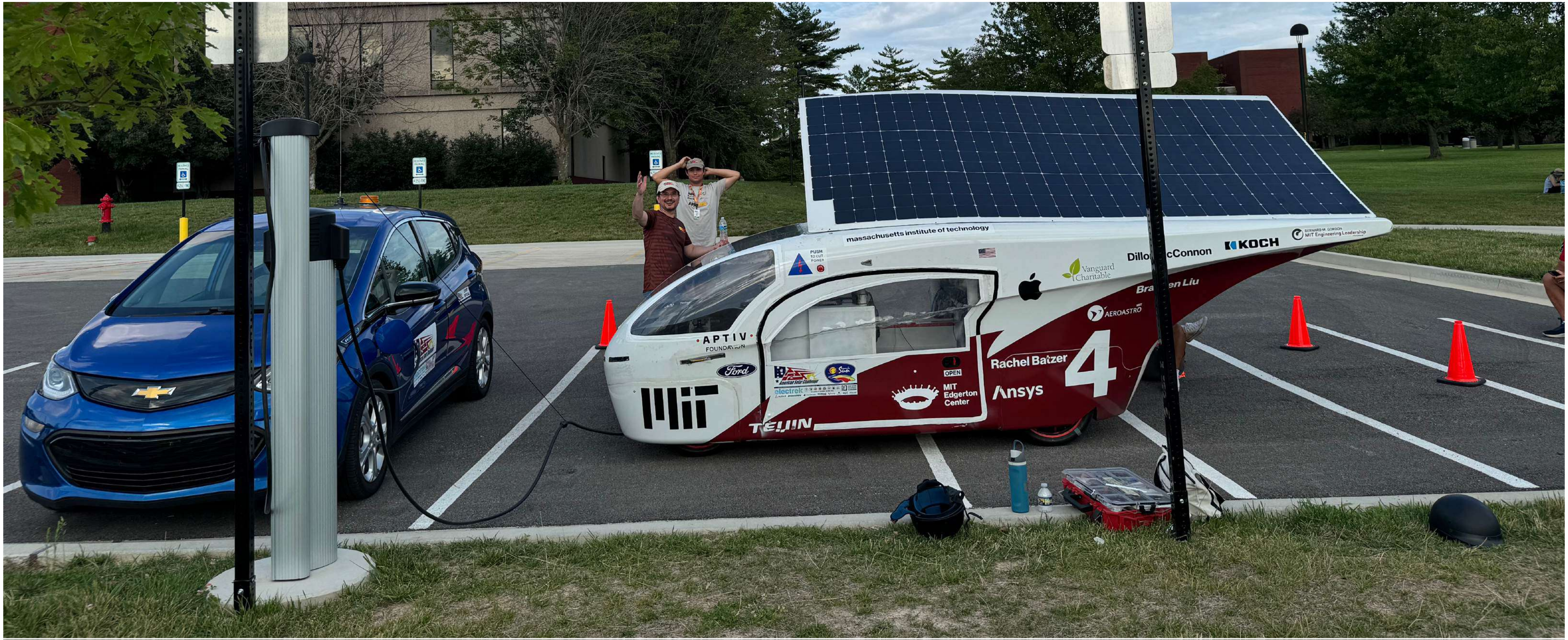
- Before the event please test that your vehicle's drive motors are automatically disabled whenever the NACS or J1772 charge plug is connected to the vehicle
  - Failing this test is one of the few ways to get a red status in the MOV station
- Design your battery box with a dedicated charger contactor linked to the BPS trip circuit
  - When in safe state both + and - charger connections must be isolated from the battery
  - The charger contactor should only be enabled during charging
- Consider adding the ability for the driver to manually set a lower charge current limit than the BPS and EVSE limits
  - This feature could be useful if you are overheating your onboard charger or overloading an electrical circuit breaker
- Test your solar car charging system at a public Level 2 charging station before the event

SCRUTINEERING LESSONS LEARNED

- We recommend bringing adapters for common 120V and 240V receptacles (test all of them before the event if possible)
  - Never charge with the AC current limit above 12A using a NEMA 5-15 (120V, 15A) plug
  - Never use a 120V plug/receptacle in an AC circuit running at 240V
  - Be very careful when using charging adapters and ensure that the connectors/wires used throughout the charging circuit (utility receptacle, EVSE/adapters/extension cords, and vehicle wiring) are rated for the charge current and voltage
  - Note that the wiring of RV and EV NEMA 14-50 adapters (converting between 3 and 4 prong connectors) are generally not compatible
  - https://parkworld.com/ can make good quality (sealed) custom adapters based on a schematic you provide
- Ensure that the IEF energy meter will fit in the vehicle and can be mounted such that it's display will be visible to collect energy readings throughout the event
- Before you come to the event, please think carefully about how you will secure/seal the charging circuit (from Vehicle Power Inlet to the Battery Box) and your impound in vehicle solution
  - Ensure that all power cables in this circuit are accessible to be visually inspected during Scrutineering
  - Try to minimize the number of seal tags required (especially for seals that must be regularly removed for impound, etc)
  - If seals must be broken to change or charge your supplemental battery pack try to ensure that the pack will last at least one day between needing to be charged
  - Figuring out sealing solutions on the fly during Scrutineering will significantly increase the time it takes to get through the MOV station
- For teams sealing their onboard chargers inside an enclosure please be sure that your charger heatsink/fans will have good access to airflow to prevent overheating (we've seen successful use of mesh screens secured from the inside of the enclosure as a means of preventing access without significantly blocking airflow)



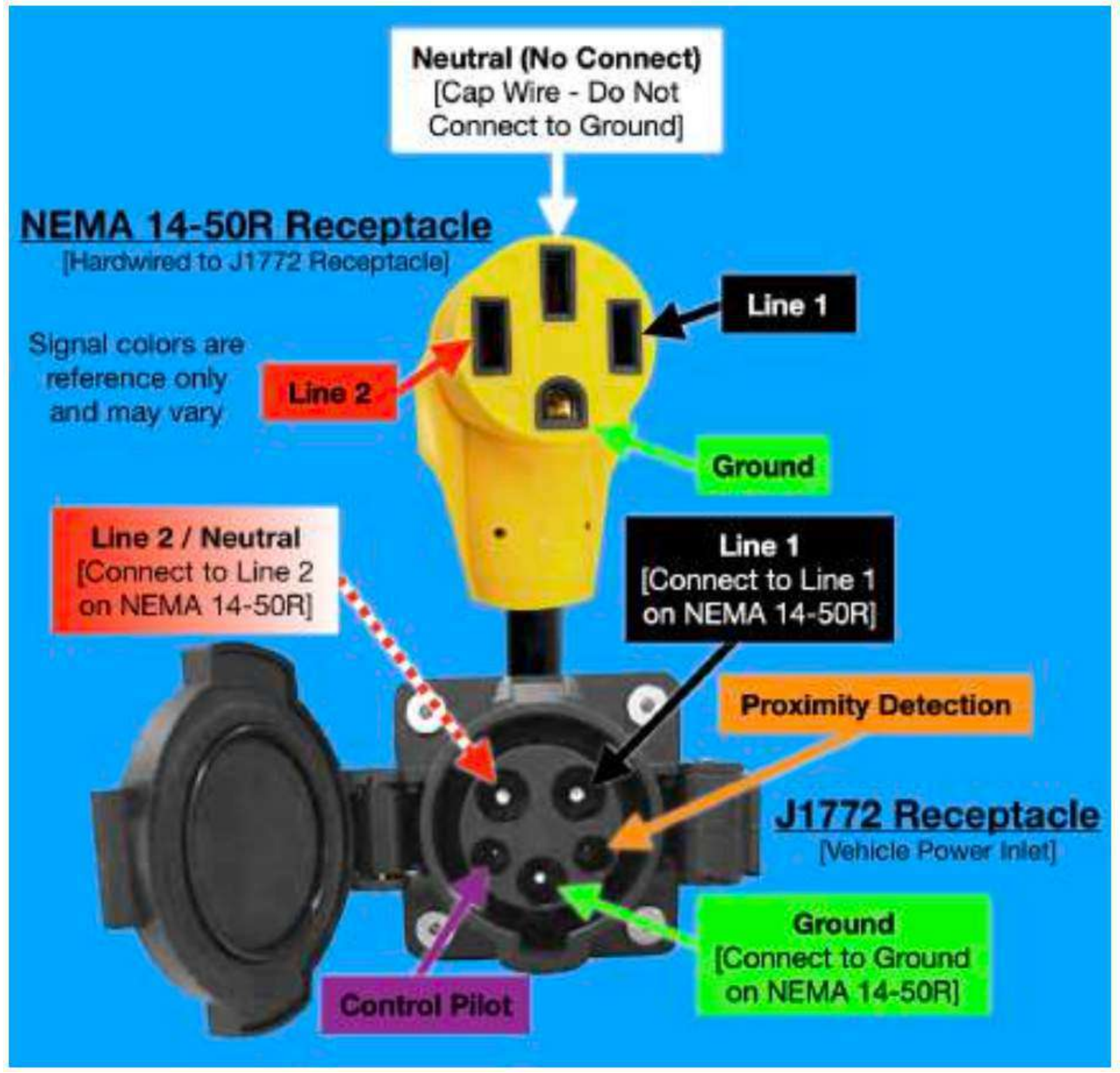
METERED CHARGING

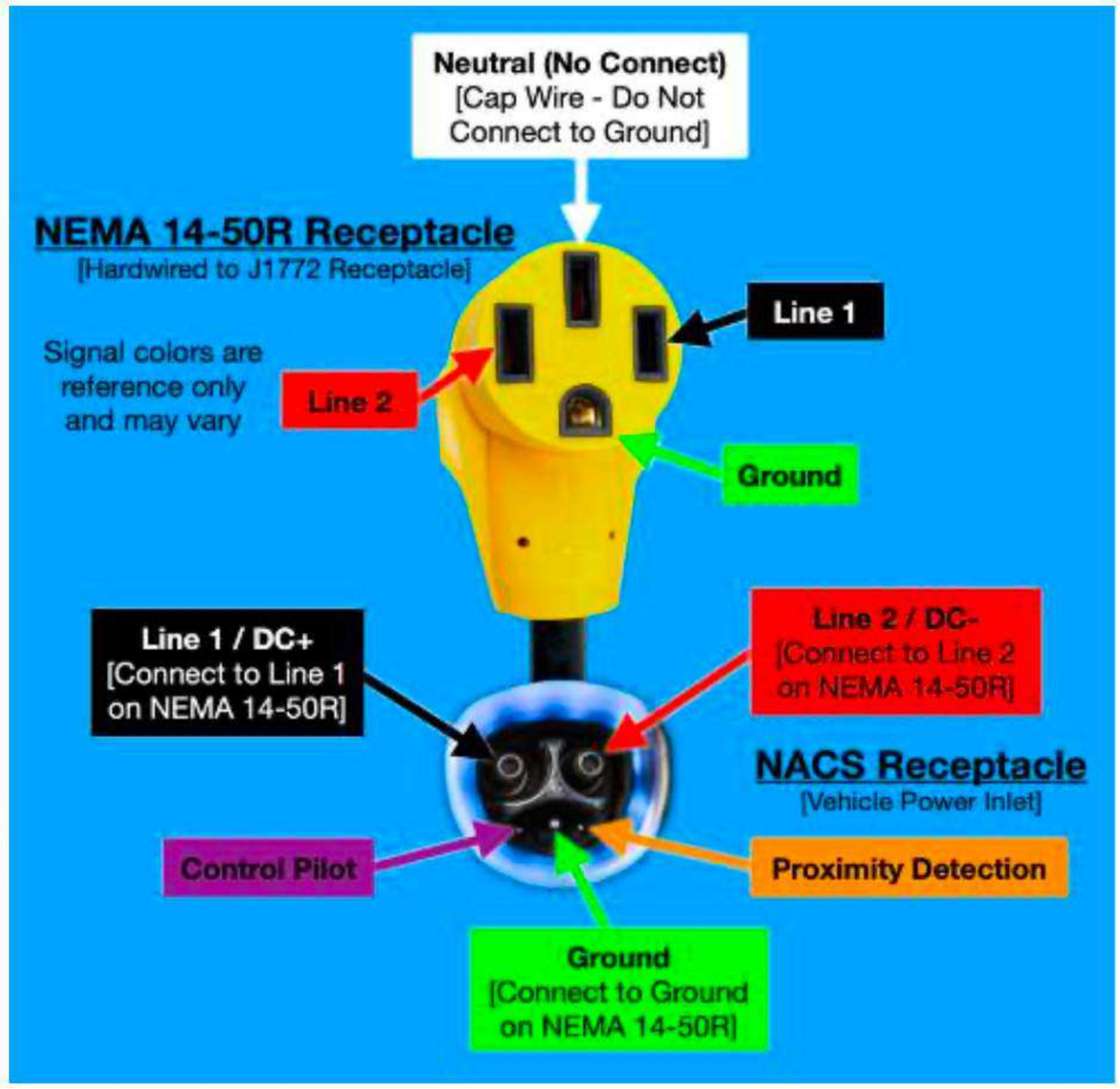
EXTERNAL ENERGY USAGE AND METERED CHARGING

- **13.2.F** - External Energy Usage (EU) = (n+1) x Q + M
  - **n** is the number of times the battery is charged from unmetered external energy
    - Multiple unmetered charging sessions are counted as a single unmetered charge as long as the solar car is not driven in the Event between the charging sessions
  - **Q** is the energy capacity of the battery in kWh calculated by the event Organizers based on the cell QTY & battery supplier data sheet
  - **M** is the total metered external energy in kWh used to charge the battery
- <u>Metered vs. Unmetered External Energy</u>
  - Metered charging incentivizes MOV teams to perform morning/evening solar charging
  - Metering enables the flexibility of partial battery charges to optimize tour strategy (teams need to record kWh reading at the beginning and end of each metered charge via a photo with time stamp)
  - Unmetered charging is available to teams that fail to certify their J1772/onboard charging system during Scrutineering
  - If for any reason an external charge isn't properly metered and recorded, it will count as unmetered
  - Look for commercial EV charging stations along the route that could be used (many campgrounds have NEMA 14-50 RV hookups)
  - We recommend having a portable generator that is capable of charging your vehicle if you are unable to find other means of charging
  - **Sustainability/Innovation Idea:** install solar panels on your solar car trailer and use them to charge up a battery during the tour day then charge your MOV from that at night

IEF Energy Meter Info

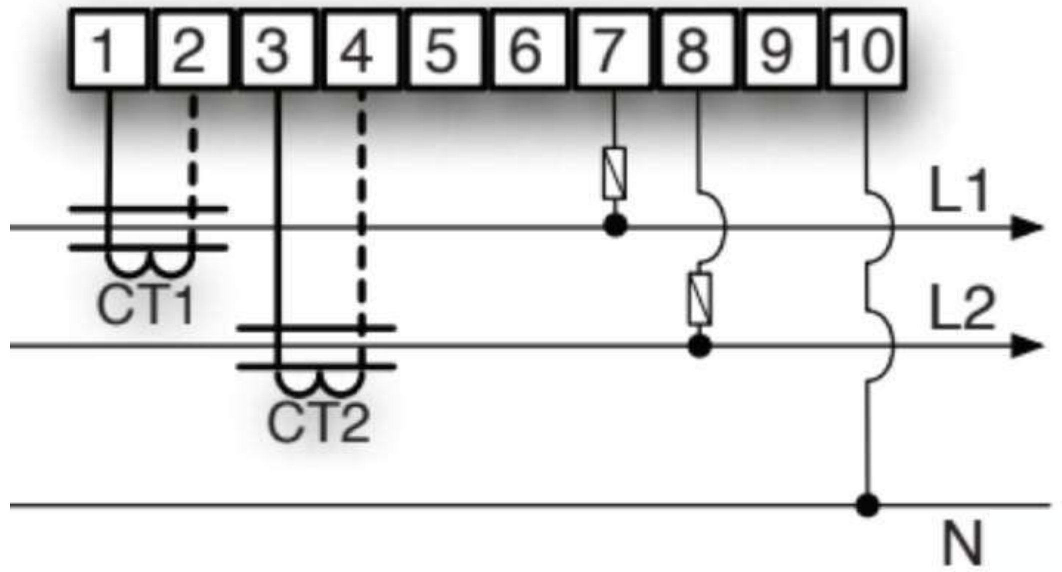
- This onboard energy meter will be provided to MOV teams by IEF
- The meter must be installed in the solar car to certify for metered charging at Scrutineering
- Omnimeter Pulse v.4 meter provides revenue grade accuracy
- Meter Display Cycle: Total kWh Energy, L1 Volts, L2 Volts, L1 Amps, & L2 Amps
- Flexible 120-240 Vac input voltage at up to 40A current
- Watertight enclosure with sealed cable glands
- ~US$500 cost for this charge meter solution
- The energy meter can be reserved in advance of the event in exchange for a US$500 deposit payment from the team and the cost of shipping
  - The US$500 deposit is refundable after the meter is returned to IEF
- Teams can construct their own energy meter using the BOM provided to the right





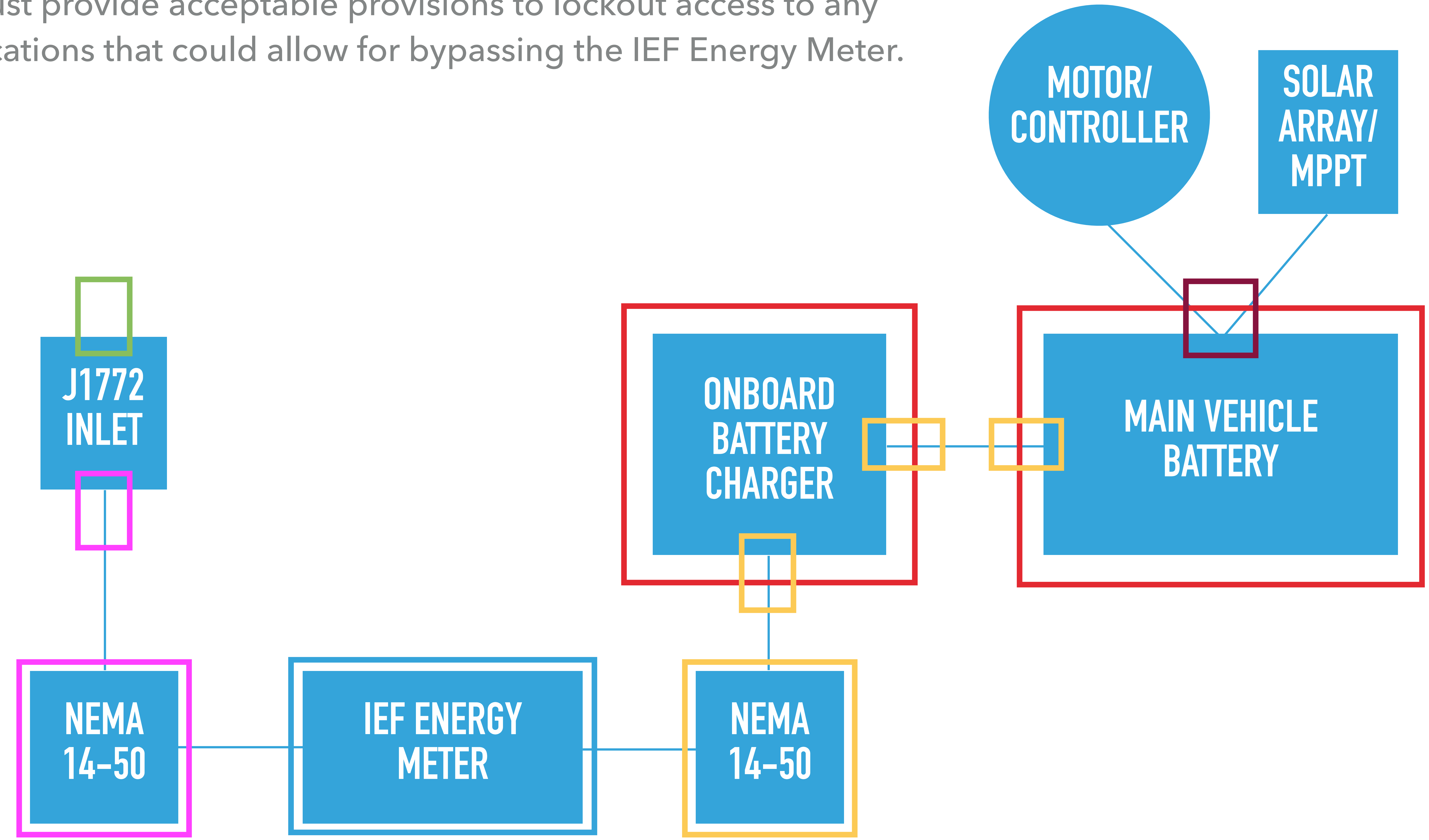
Item	QTY	Unit Cost	Total Cost
EKM Omnimeter Pulse v.4 – Universal Smart Meter	1	$ 260.00	$ 260.00
EKM Split-core CT, 200A Current Transformer	2	$ 45.00	$ 90.00
EKM Watertight Enclosure with Hinged and Latching Lid (6.7" x 10.63" x 4.33")	1	$ 80.00	$ 80.00
Camco 55215 18" PowerGrip Extender - 50 AMP	2	$ 19.95	$ 39.90
Marathon Special Products 1414300 Splicer Block, 4-P, 115A, Line: 2AWG-14AWG	1	$ 18.08	$ 18.08
Waterproof Cable Gland (2pc Set)	1	$ 10.05	$ 10.05
Total			**$ 498.03**

IEF Meter Box Current & Voltage Sensor Reference



METERED CHARGING LOCKOUT LOCATIONS TO BE INSPECTED

In order to be certified for metered charging, MOV teams must provide acceptable provisions to lockout access to any locations that could allow for bypassing the IEF Energy Meter.



Color Key

- Provision to lockout internal access
- Provision to lockout connector access
- Provision to disconnect and lockout access during impound
- Meter enclosure is provided locked out
- Exposed conductors not allowed and must prevent inadvertent disconnection but lockout not required
- J1772 is always accessible to teams certified for metered charging


MOV STRATEGY

ASC 2026 MOV DESIGN OPTIMIZATION STRATEGY (EVAN'S RECOMMENDATIONS)

- **8.1.B** - Get as close as possible to maxing out the allowable 5m^2 solar collector area
- **8.2.A.2** - Get as close as possible to maxing out the allowable 15.5 kWh of battery capacity unless you are confident you can finish full ASC days with a smaller pack while driving at the speed limit without needing to stop to charge
- **8.12** - Ensure your vehicle is designed with an onboard charger system that is capable of fully recharging the pack overnight and able to be certified for metered charging at Scrutineering - more efficient onboard charging will help your Optimization score since metered energy includes onboard charging system losses
- **9.1** - Make the vehicle as small as possible while still meeting solar collector area, occupancy, energy storage, structural, and aerodynamic objectives
- **10.2.A.1** - When evaluating wheel/tire options, consider speed/load rating, tire inflation pressure/rolling resistance - design with 3 wheels unless 4 wheels is required to support the vehicle weight/stability/braking requirements up to max speed
- **10.3.B.2** - Design for 2 occupants unless you are confident you can finish full ASC days with more occupants while driving at the speed limit without needing to stop to charge
- **10.9.E** - Ensure that your motor solution has enough torque to start up a hill but also enough speed capability to drive 65MPH (or as fast as you plan to drive) with your desired number of ballasted occupants
- **13.2.G** - Prioritize practicality objectives that come with minimal cost to energy efficiency
- **8.11.B** - Create a robust impound in vehicle solution that is easy to seal/inspect (with a max of 4 labelled seal locations) which will save time at Scrutineering and morning/evening solar charging

ASC 2026 MOV PRE-EVENT TEST SCENARIOS (EVAN'S RECOMMENDATIONS)

- Test at different tire pressures and try to understand the relationship between tire pressure and life while minimizing the influence of other variables such as speed, cornering loads, and vehicle weight
  - Is it always better for you to run the max rated pressure or is there a lower pressure that would allow you to run more distance in an event day due to less tire changes/blow outs? - This could be especially relevant during the FSGP track competition
- Test with different numbers of occupants to understand how this will affect your Optimization score
  - Do you always see the highest Optimization score when running with higher occupancy? - You should as long as the new-to-old occupancy ratio is greater than the new-to-old vehicle weight ratio
  - Is this result consistent at low, medium, and high speeds?
- Test at different target cruising speeds from 45MPH up to 65MPH (or the max speed you plan to run) to see how target speed affects your score
  - Do you always see a higher score when driving at higher speeds even though it results in lower energy efficiency? - You should if we've correctly crafted the new MOV scoring formula
  - Starting with a full pack, what target cruising speed is your car able to maintain over a 7-8 hour period in mixed city/highway driving before the battery dies?
    - Work on your state of charge estimation algorithm throughout testing (the better you understand your remaining energy available the better you'll be able to execute your driving strategy without running out of charge)
- Test the efficiency of your onboard charger (if utilizing metered external charging, energy lost due to onboard charger inefficiency is included)
  - If your battery pack is dead at the end of an event day and there is minimal opportunity for evening/morning solar charging this may be a scenario where it makes more sense to do an unmetered charge so you don't take the efficiency hit from your onboard vehicle charger
- Test external energy charging using your own EVSE and portable generator

ASC 2026 MOV OPERATIONAL SUCCESS STRATEGY (EVAN'S PRIORITIZED RECOMMENDATIONS)

1. **6.1.C** - Achieve all greens on the Team Status Board and practice Scrutineering (especially Dynamics) prior to the start of the event
2. **Section 2** - Show up to Scrutineering with a technically compliant car that is complete, functional, and well tested (including occupant/tire changes)
3. **6.1** - Get to Dynamics early and pass Scrutineering as quickly as possible before the start of FSGP
4. **14.12** - Complete enough FSGP laps to qualify your drivers and vehicle for ASC
5. **13.2.I** - Complete as many valid FSGP laps as possible (minimal penalties, reliability, & energy management are key)
6. **13.2.I** - Run with as many occupants as possible on each lap that allows you to confidently get through the full 8 hour FSGP days without needing to stop to charge (adjust target speed and occupants based on weather/driving conditions to end each day with a nearly dead pack)
7. **13.2.I** - Get as much energy as possible during the evening solar charging session then externally charge overnight enough that you are confident in achieving a full pack in the next morning's solar charging session
8. On day 3 of FSGP, if you are already qualified for ASC and confident in your FSGP finishing position, consider if you want to attempt some fast laps but try to not break your car and remember this is only for bragging rights (and possibly an award certificate)
9. **13.2.G** - Provide a great window sticker and have team members ready to give practicality judges their best possible impression of your vehicle
10. **12.3.A** - Complete the ASC base route book steps without trailering (scouting, minimal penalties, reliability, & energy management are key)
11. **13.2.A & 12.16** - Choose loops to run based on weather, traffic, & available time/energy to maximize your ASC distance driven - remember there are usually two or more loop options at different locations along each segment - consider slowing the final loop of each stage to save energy & finish just before your stage close time
12. **13.2.B** - Run with as many occupants as possible on each segment that allows you to confidently get through the full ASC days without needing to stop to charge (adjust target speed based on weather/driving conditions to end each day with a nearly dead pack) - don't forget about mandatory hold time
13. **13.2.B** - Maximize your evening solar charging session then externally charge overnight enough that you are confident in achieving a full pack in the next morning's solar charging session - the last day of ASC is typically short so you may not need a full charge to go the speed limit that day

OPEN DISCUSSION AND Q&A