

Meeting Minutes for 10-13-20 â?? Lithium-ion Car Battery Recycling Advisory Group

Description

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Lithium-ion Car Battery Recycling Advisory Group

Meeting #5 Draft Minutes

October 13, 2020

1. Call to Order, Roll Call, and Establishment of Quorum

Caroline Godkin (CG): Good morning and roll call.

Advisory Members in Attendance:

- Mohammed Omer (MO)

- Courtney Smith (CS)
- Terry Adams (TA)
- Dan Bowerson (DB)
- Mark Caffarey (MC)
- Todd Coy (TC)
- Toshiya Fukui (TF)
- Perry Gottesfeld (PG)
- Steve Henderson (PH)
- George Kerchner (GK)
- Bernie Kotlier (BK)
- Nick Lapis (NL)
- Teija Mortvedt (TM)
- Geoff Niswander (GN)
- Alison Linder (AL)
- Lou Ramondetta (LR)

CG:

- Quorum established.
- Thanks to UC Davis partners for preparing the background documents.
- Since last meeting it has been a busy summer. Governors order requiring 100% car emission sales by 2035. Great opportunity for the state to lead. It makes this work so much more important with the increase of EV batteries using Lithium-ion batteries.

CS:

- AB 1657 Garcia bill signed by Governor Newsom.
 - Calls for the energy commission to establish and convene the blue-ribbon commission of 14 members to look at lithium extraction & use in California.
 - This will look at economic, environmental, and social impacts; market opportunity to extract lithium from geothermal brine byproducts.
 - This is due Oct 21st, 2020 (?)
 - The process for identifying committee members opens in November, commission to be established by the end of the year. This will be by public process.

2. and 3. Review of Draft Minutes and Interim Updates

MO:

- Please put that you have a question in the chat. We will circulate the executive order and bill with the meeting materials.
- This will all be online with meeting notes, video, and background documents. The questions will be answered in the order asked. Email questions to calepaworkshops@calepa.ca.gov . A list

serve is also available, please subscribe to receive updates.

- Does anyone have an issue with the notes from the last meeting?
 - Meeting minutes are approved and finalized.
- Topic of this meeting is battery policy and regulatory frameworks. The first presentation is by Oliver Heidrich from Newcastle University.

4. First Presentation: Electric Vehicle Battery Policies and Initiatives in the European Union by Dr. Oliver Heidrich from Newcastle

Purpose:

- Describe the motivation.
- Current policies.
- And how we can tackle this problem.

Motivation:

- We look at the mitigation and strategies for climate change and how tech and infrastructure can design and engineer solutions to avoid unintended consequences.
- We analyzed EU core cities and found that they see EVs as the solution to carbon neutrality. The UK cities also find that EVs are the most desirable measure to achieve transportation decarbonization. We found that climate change strategies and EV policies have no impact on EV uptake.
- There is a clear time lag between policy and technology uptake. The carbon reduction in the UK can only be achieved if there is an uptake of EVs soon.
- The Faraday Institute: A large research program. The Faraday Mission is to lead the world in energy and technology of lithium-ion batteries.
- ReLiB â?? Aims to facilitate a circular economy in LIB, tackling technical and social economic challenges.
- EV lithium-ion battery recycling is key to meeting EV demand and the Faraday project is timely.
- We have the following questions:
 - How much materials are embedded in the Batteries?
 - How much of the materials are available?
 - Where are the materials coming from?

This has led to the questions: Can we have a circular economy strategy that policy makers can implement; what are the recycling technologies; and what type of materials can these recover?

Current Policy

- The materials need to be transported to get to the recycling facilities and the European Union is currently taking measures to coordinate reverse logistics.

- The Basel Convention restricts the transboundary movement of hazardous waste. It includes any battery and EV batteries. This is the most internationally agreed upon document.
- Battery Directive- establishes battery standards. The European Commission is clear that this battery needs to be updated to fit lithium-ion batteries. LIBs are currently classified as “industrial”, there is no incentive for eco -friendly design, more than half of batteries are not recycled or collected. In 2020 the commission to develop a new directive. They plan a new collection target and recycling values for certain materials. The EU working document considers lithium-based batteries and will be looking from resources extraction (outside EU) to the end of life.
- Waste Shipment Regulation “ tracks the shipment of batteries.
- Extended Producer Responsibility.
 - Success rate is between 30-70%, this is the collection rate for all batteries.

Possible Solutions

- The Global Battery Alliance is establishing a circular battery value chain as a driver to achieve the Paris Agreement.
- Challenge: knowing where cars will go at disposal.
- The closed loop recycling is more beneficial for the environmental impacts, and the open loop recycling is less beneficial.
- Next step: Look at novel recycling technologies. This includes looking at tear down reports and comparing with the BatPac model.
 - In the UK we are unaware of the capacity of recyclers and are attempting to understand what will happen if the supply chain of materials collapses. Transportation of batteries is extremely difficult and requires development. Also, what will happen if the chemistries of batteries change?
- Policy recommendations:
 - Clear understanding of environmental and social impacts,
 - EPR to support recycling
 - Transparent supply and value chain
 - Traceability
 - Reverse logistics
 - Standardization
 - Battery passport: supports data sharing throughout the supply chain. This will become operational in 2022.

Questions and Answers from Presentation 1:

MC: At no time do you mention the hydrogen economy. Is this because it is out of scope? If I understand it right, to make this work you need EPR? I think this is a topic of interest. Is EPR a must for recycling?

- OH: I am not an expert in hydrogen, and it is not part of the scope of our work. In Germany there is a big drive for hydrogen, but there is equally a drive for EVs. They are pushing hard on this. Yes, EPR is a must.

MC: Do you think the advisory committee should look into redefining the shipping of LIBs as nonhazardous or keep it as hazardous?

- OH: I highly recommend keeping it hazardous. LIBs are hazardous and explosive material, moving without controls can cause a lot of problems. We have a paper under review identifying serious issues with transportation.

PG (read by MO): What are the restrictions for transport of used li-ion batteries in the EU? And does this depend on if it will be reused vs. if it is going to be recycled?

- OH: There is no difference; transport restrictions are the same no matter the final destination of the battery (remanufacturing, recycling, waste). Currently you need a special license to move the battery. There are many regulations across the EU. In the UK there are additional safety measures. This is important because ten years ago you could get around the regulations by demonstrating that the battery is not a waste but a resource. This loophole has been closed. Some of you will have known about China limiting the import of waste materials that used to be classified as a "resource" but again this loophole has been closed.

SH: I work at Ford and we sell in Europe as well. The transport of batteries is graduated, and my understanding is that nondamaged batteries can be transported in a more relaxed way, but damaged batteries are quite difficult. Is this true?

- OH: No, all used batteries need a special license. I do not know how expensive it is to move the batteries; it is less expensive than liquid hazardous waste but still costly. Moving a large shipment is more straightforward than moving one battery at once.
- SH: Safety issue on one side, and cost issue on the other makes it a really important issue.
- OH: In the UK, if we move the battery outside the UK, we must comply with the Basel Convention. It is a rigorous process.

GK: Clarification not question: Because the EU has been collecting batteries for a long time, battery companies have worked with government and done a good job of developing a system to facilitate the movement of waste batteries. Our counterpart in Europe Recharge has been able to work with EU and get an efficient program under "dangerous goods" legislation. ADR has good packaging and labeling instructions. I think most countries don't consider LIBs as hazardous waste.

- OH: LIBs are considered a hazardous waste in the Basel convention. Clarification between "hazardous waste" and "dangerous goods".

GN: You used the phrase explosive waste—are they defined as "explosive" or is it just a fire hazard?

- OH: They are not defined as explosive waste, just fire hazard. They can explode but are not regulated as explosive material.

TF: Do you see transport regulations changing in UK and EU to facilitate LIB recycling?

- OH: I don't know; I think they will. I believe it is an important issue and there is a legal requirement to keep people safe. If the question is would it be nice, then yes, but I don't know if they will.

CG: How does grid storage (2nd life) how does that play into the policy and EPR?

- OH: Yes, great question; EPR is not clear cut. We believe the battery passport may be a better way of thinking about this. We are doing a lot of tests to look into the second life options and working with Siemens to examine peak shaving (to provide power when people put the kettle on during halftime during football matches). Colleagues at Birmingham University are looking into regulation; there is a chicken and egg issue with engineering and regulation. You can't really go after regulatory until you understand the technology/engineering solutions, and the reverse.

Gavin McHugh (Read by MO): Question for the professor: Does he envision the revised EU Battery Directive including reuse as a viable option? Would he agree that reuse is a good option from both an environmental standpoint and from an economic standpoint as an affordable option for vehicle repairs?

- OH: Yes, it needs to include reuse. If the battery directive doesn't include reuse it will have failed. I always refer to the waste hierarchy. We must always think about reuse. This is almost coming back to the second law of thermodynamics. If you can avoid losing the energy that has been put into the battery already and reuse, this is much more desirable, and the battery directive definitely needs to consider this and I know they are working on it.

MO: Thank you for the great presentation.

5. Presentation on Worldwide Electric Vehicle Battery Policies and Initiatives by Dr. Alissa Kendall, UC Davis

AK: Thank you, this presentation will be a discussion on global policies.

- Broadly speaking, LIB demand has increased drastically due to EVs, much surpassing the LIB demand of electronic devices.
- China, the U.S., and the EU are the leaders of EV sales.
 - Within the U.S., California comprises about half the U.S. sales.
 - The RoW are still a very small fraction. This guides our understanding of what policies are out there.
 - China will continue to be a very important market. The U.S. and Europe will still be important, but the RoW will increase and become more important. Places we historically see EV sales, will continue to be leaders.
- Knowing the reverse logistic steps and the processes for EOL management of (reuse, recycling, remanufacture, or dispose) will be important for LIBs.
 - This mirrors the waste hierarchy as we see the preference to where batteries go. Another way of thinking about this is who is responsible for the EOL management and who bears the costs. There are times where recycling, rather than reuse, is the preference (e.g. refrigerators)
- Policy approaches: Who is accountable for EOL management?
 - Consumer oriented:
 - Landfill ban: makes consumers responsible but relies on government to create designated accessible pathway for disposal

- Deposit-refund; makes buyer responsible for cost at time of purchase; and incentivizes consumer returns
- Producer-oriented
 - Extended producer responsibility -producer is responsible for the cost and the product end of life.
- Incentivizing or requiring changes to product design
 - Design for recycling to lower recycling costs
 - EPR laws often intended to promote design for recycle
- Labeling and traceability
- Standardization of design or chemistry to enable recycling
- Recycled content requirements
- This is not implying all these approaches are already in place for EOL. Many of the policies in place are currently created for small consumer electronic batteries, and there are also special vehicle end of life (ELV) requirements.
- Comparison of ELV management policies.
 - U.S.: No national policy
 - EU and China: Yes, policies.
- China:
 - Promotion plan for extended producer responsibility system (2016)
 - Interim Measures for the Management of Recycling and Utilization of Power Batteries of New Energy Vehicles (2018)
- U.S.: No, EOL EV LIB policy
 - The battery act (1996)
 - The U.S. Department of Transportation regulates shipment of live batteries
 - New York, Minnesota, and New Jersey have EOL battery policy but no reporting requirements and therefore can't judge the success rate
- California
 - DTSC and CalRecycle manage these regulations
 - Failed bill, Senate Bill 1156, did not make it through the Assembly, but if it had there would have been more standards on the disposal.
- The Global Battery Alliance (GBA) was discussed by Oliver, but there are also multi-region and multisector efforts. They have produced the battery passport.
- Presented table showing a comparison of policies in the EU, China, India, and Japan

Questions and Answers from Presentation 2:

GK: The Mercury Containing and Rechargeable Battery Management Act. It addressed the nickel and cadmium specifically. Different LIBs may be hazardous waste, but the battery management act was silent on the lithium-ion batteries. New York and Minnesota are the states that require reporting.

- AK: Apologies, the mercury-containing rechargeable does not include LIBs, it was a follow-on to clarify that LIBs are considered hazardous due to flammability.
- GK: All batteries are universal waste. The mercury-containing and rechargeable in 1996 was important in helping facilitate the management of those batteries.
- MO: DTSC will be presenting about California classifications
- GK: We fully supported Senate Bill 1156; it was a great, well-written bill that fell through the cracks but hopefully it will come back. It was about outreach and educating consumers and

industries about handling LIBs.

CS: Thank you Alissa. One of the things I had an assumption around was that the EPR would be reflected in the cost of the vehicle. Do you have a value of the cost to end users? Is there data around how much EPR requirements in the EU have increased the cost of vehicles?

- AK: Research suggests that the impact of EPR is small on cost and design/recycling, although there are innovations that have come out regarding part labeling.
- CS: In terms of effect on vehicle cost as well as actual recycling rates?
- AK: Yes, I read a paper on this recently. The literature says that there are few differences in the costs of vehicles between regions.

PG: My question is about the hazardous waste requirements, so I will hold off until that talk.

NL: Thank you, this is super helpful! I have a question about some of the international policy. Do you have an idea about what types of batteries they cover? How many go beyond LIBs?

- AK: The Battery Directive goes beyond LIBs and was developed before li-ion became common in vehicles. For China, we don't have many details yet on how that is being implemented. For Japan, they have some work going on to figure out NiMH batteries in hybrid vehicles separate from their vehicle recycling law but they also export a significant amount of vehicles outside the country, so they basically forego end-of-life management.
- NL: I was going to ask about what recycling rates they're actually seeing but it sounds like because they're sort of conflated for the entire vehicle it might be hard to get that. Is that true?
- AK: Yes

TB: Thank you, great presentation. Do we have a sense of what is working? Where does reuse fit in for all of this? Do these policies include reuse?

- AK: In broad strokes, when we have handled starter batteries we have focused on recycling and disposal but not reuse, so we are not likely to draw examples there. We have a healthy remanufacturing industry that remanufactures parts and puts them in vehicles, and we may see exactly that happening; some may be remanufactured and put back on the road in vehicles with shorter ranges. When we talk about reuse in stationary applications, the policies that have been created to address batteries in the past have not included that. It is an opportunity for us to think about second life uses outside of a traditional manufacturing industry.

TF: I was talking to one of our battery partners in China, and my understanding is that the Chinese EV battery recycling policy is great in theory, but the implementation still has a lot of challenges. I do not doubt that China will achieve their EV battery recycling goals, but, at present, there are only five companies that are authorized "White List" companies and over 800 recyclers that are not approved on the "White List". The challenge will be how to enforce non-compliance to battery recycling policies. My contact predicts that next year there will be 15 to 20 "White Listed" companies. The EU Battery Directive has been around longer and has its own set of challenges with EV batteries, while the newer Chinese policy addresses EV issues but is still being implemented.

SH: Thank you. It feels this is such a big issue and an economic issue that is different than lead acid. We will need to use all the tools in our holster. Used cars need to be cheap to adopt the EVs and this is

a good way to reuse the battery. Batteries should be reused with minimal shipment where possible.

CG: Are any of these schemes thinking about leasing batteries for first use or is this too advanced at the moment?

- AK: We didn't see anything in the literature, but leasing is increasingly discussed as a viable option for batteries and could make the system better organized. Steve probably has some insights. The company that led on innovation for design for repairability, reuse and recycling was xerox and they did that when they moved from selling to leasing machines and being responsible for repairs.

MO: It is interesting to me that the only region that talks about subsidies is India. We have talked about the economic viability of reuse and recycling. Did subsidies, on the flip side of penalties, did those come up at all?

- AD: Some of the work coming out of Argonne National Lab focuses on the idea that the government spends a lot of money in developing battery technology, but hasn't invested on the same level in recycling technology and supporting a recycling industry. So that is one view that there is a mismatch between government investment in production but not recycling.
- Jessica Dunn (JD): No, India is still developing the policy and they are the only region to discuss implementing the subsidy.

PC: Regarding the battery passport, do you know if the passport will also manage other information about the vehicle and battery?

- AK: Seems like VIN and other information will be included; other Blockchain tools like Everledger are developing tech to track supply chain and battery chemistry.

Ron Dumas: Regulations on dismantlers are burdensome and have resulted in growth in unlicensed dismantling; most EVs are sent out of state

CG: Thank you everyone. We will take a break for lunch and will be coming back at 1pm.

MO: the next presentation is one of many presentations from DTSC.

BREAK until 1 p.m.

6. Third Presentation: Dr. Meredith Williams (MW) and Valetti Lang (VL) with DTSC

MO: Introduces Meredith Williams and DTSC as the primary agency in charge of enforcing hazardous waste laws.

MW: Thank you all for taking the time to participate in this and serve on this committee. LIB disposal is an issue that is coming up more often. There was a fire recently just outside my window at the metals recycling facility, and I wondered whether it was a LIB. We know from experience with lead acid

batteries that recycling can have significant impacts and we want to avoid that. This presentation is about DTSC's authority and how it intersects with LIB policy. It is a confusing landscape and the team put a lot of effort into this presentation. Thank you very much and I will pass the presentation to Ms. Lang.

VL:

- Good afternoon and thank you for this opportunity.
- DTSC is one of 6 agencies under the California EPA; DTSC and Cal Recycle both have roles relating to the management of LIBs
- DTSC's mission is to protect people, communities, and the environment by enforcing the hazardous waste laws.
- Material recovery and EPR is primarily implemented by CalRecycle; management falls under DTSC if material is identified as hazardous waste
- Federal law Resource Conservation and Recovery Act RCRA:
 - The U.S. EPA sets minimum standards to set a consistent baseline for all states. States may apply for RCRA Authorization to enforce their own requirement if their standards are more stringent or extensive than federal law.
 - The U.S. EPA evaluates standards to ensure they are consistent with minimum standards.
 - DTSC is the primary enforcing authority for RCRA requirements and state regulations in California.
- Regulatory and rulemaking process definitions
 - Statute – proposed, amended, and passed in legislature. Then approved or vetoed by the governor
 - Regulation – government agencies (e.g. DTSC) adopt a regulation to implement, interpret, or make specific the law enforced by agency
 - Policy- written document issued by a state to interpret guidelines; not enforceable.
 - Only statutes and regulations carry weight of law
- Regulatory development process – DTSC goals
 - DTSC considers environmental, economic (how much will it cost business to follow proposed regulations), fiscal impacts (time, effort, training, permitting/enforcement by the State) when developing regulations
 - Works with manufacturers through Safer Consumer Products Program to ensure a reduction in chemicals which may become hazardous waste, but also want this to align with industry
- Definition of Hazardous Material: a material that, because of its quantity, concentration, or physical or chemical characteristics pose a risk to human health.
 - Defined in California Health & Safety Code 25501 (link is in slide)
 - Hazardous materials are not necessarily wastes.
- Definition of Waste: – any discarded material of any form that is not excluded
 - Key point is that its condition is not necessarily important to waste classification. If one would like to relinquish something, it is considered waste regardless of whether it works or will be reused.
- Definition of Hazardous Waste: Material that meets criteria of – waste – and has properties which make it potentially dangerous or harmful to human health or the environment
 - Can either fall under one of four RCRA Hazardous Waste lists (F, K, P, U) or California classification: Ignitability, corrosivity, reactivity, or toxicity.
 - DTSC provides training on how to determine classification

- Definition of Universal Waste (UW):
 - Categories of hazardous wastes that are selected for streamline management.
 - California's UW program is authorized by the U.S. EPA. Categories are in Title 22 of the California Code of Regulations 66261.9
 - Batteries are universal waste under U.S. EPA and California definitions.
 - California is authorized to add a new waste stream to DTSC's universal waste program, provided the waste meets universal waste criteria.
- Waste determination -battery example:
 - A handler may consolidate, discharge, store (up to a year), and send batteries to an authorized recycling or treatment center without authorization.
 - Treatment, which includes crushing and recycling under CA law, is a hazardous waste activity and requires authorization.
- Facility Authorization in California:
 - Permitting is a form of authorization. The permitting program has offered to provide a detailed overview of the permitting/facility authorization process in the future.
 - DTSC has a 5-tiered permit structure.
 - Tiers 1 and 2 are for on- and off-site activities; offsite means you are receiving material that you did not generate.
 - Tiers 3, 4, and 5 are for on-site generators.
 - Waste Management Standards:
 - Hazardous Waste: Chapters 12-16, Title 22, California Code of Regulations
 - Universal Waste: Chapter 23
 - Permits/Authorization: Chapters 14 and 15
 - Thank you! We have time for questions

Questions and Answers from Presentation 3:

TA: At what point does a used battery become a universal waste battery? Is a battery taken out of a vehicle that will be sold for reuse considered Universal Waste?

- VL: A great example is lead acid batteries, which are fully regulated as a hazardous waste. Depends on application; if I have a battery that I take out of a car and put it back in a car, that is not a hazardous waste. If material will be used in the same way, this is not a hazardous waste. This is considered continued use.

PG: If LIB is dismantled and then repurposed is that still considered use?

- VL: If it is dismantled this is considered treatment you will need a permit. Treatment is everything (changing physical nature) except discharging the battery.

PG: Can you explain the requirement for shipments of greater than 10 batteries?

- VL: You can transport universal waste following DOT requirements but do not need to call them hazardous waste; this criteria (ten battery limit) applied for lead-acid batteries and not universal waste batteries.
- Rizgar Ghazi (RG): (Poor audio) The transportation depends on the number of batteries. Less than ten does not require a transportation license unless you are a collector for recycling you do need transportation.

GK: You have raised a couple issues and opened a can of worms. California needs to clarify for industry. If I have an EV battery and I don't know if it has a second life to it, and I ship it to a dismantler or repurposer who will determine whether the battery will have a second life, is this considered hazardous waste?

- VL: Great questions. If you take the battery out of the vehicle, when you ship it the battery is relinquished it is a waste, but you can do this under universal waste rules. They are in receipt of hazardous waste and universal waste which they are now treating the battery and will then have to receive authorization. In California this is likely to require Tier 1 or 2 authorization.
- GK: Wow. What you call dismantling is happening all the time for E-waste batteries.
- VL: Thanks for the e-waste example. E-waste dismantling is allowed under universal waste classifications, but this is not the case for batteries.
- RG: We have been managing LIBs as universal waste. As soon as it is dismantled you need a separate hazardous waste permit.

BK: My understanding is that resale is permitted when the full pack is taken out of one vehicle and put in another vehicle. What if that pack is put into stationary use? What if it is divided into modules?

- VL: If you are talking about breaking it apart then you are changing the physical form. If you have a unit and you dismantle it, that is dismantling. Taking screws out and changing the physical form requires authorization. The nuance of continued use relates to the permissibility of the use case in question. We are good at providing site-specific information and there are technical staff who answer thousands of these questions every year.

TA: There is a cottage repurposing industry and many people are taking batteries apart and putting them back together. I doubt they have permits. A battery can't be reused without some type of disassembly. A lot of the batteries will be exported if that is DTSC's stance. I also don't like the word relinquish.

- VL: Yes, if it is sold when someone doesn't want the material, this is relinquishing. California is not allowed to be less stringent than the federal government, and batteries are a universal waste so treatment cannot be allowed
- TA: Clarification on the definition of relinquish; does it matter if the battery is sold or donated?
- VL: No, even if they are sold, they are still being relinquished and it meets the definition of waste.
- RG: VL is giving an overview of the regulations and not for these specific hypothetical cases.

NL: I think about half the group has the same question and I would love to hear more about it. If you go from using the EV battery in a vehicle and then to a stationary storage device, what does this mean?

MO: Let's create a living document that has questions for DTSC so we can discuss the specific cases.

Phil Blum: Would not the batteries be used or reused and thus be excluded from definition as a waste or hazardous waste per HSC 25143.2 or 25143.9?

VL: You may be able to request an exemption (make a claim for exclusion consistent with HSC requirements); we can work on amendments and allow minimal activity. CalRecycle and DTSC have worked together to create amendments. E-waste program is an example. In 2000 one could not do any type of treatment on an electronic device and we came up with a program for safe and effective treatment of CRT and E-Waste. This kind of solutionâ??finding safe things to do with this wasteâ??could be part of the policy recommendations that come out of this working group.

TC: I think we need a definition for disassembly and the idea of changing the form factor.

GN: I have been working in household hazardous waste for years. Great presentation. Just want to understand the permitting structure. Given an EPR, when we talk about a consumer bringing battery to the dealership, would the dealership need a permit?

- o VL: No, they would not need a storage permit. They can store the batteries onsite for one year.

GN: The dealership could ship the batteries and to a permitted facility which would then be responsible for breaking it down and dealing with materials. The discarded materials would then be managed as hazardous waste.

GK: Can a damaged Li-ion battery be handled as a universal waste?

- o VL: Yes

PG: Which part of these issues are regulated by CA and can be changed with CalEPA or Federal EPA?

- o VL: Both state and federal. Very little is under CA specific requirements.

NL: Clarification of relinquish vs. discard; in certain contexts, discard can also mean you have paid for service.

- o VL: The exchange of money doesnâ??t change that I am giving up custody of materials and therefore relinquishing them. Discarded means you didnâ??t want something, so you got rid of it. I recommend that as there are different terms that different agencies use, perhaps create a glossary of terms for DTSC vs other agencies. This is very important.

JK: I agree that the definition of terms would be helpful. Thank you for the wonderful presentation. How does the EPA monitor the authorization that DTSC has under RCRA? How does DTSC inform feedback to federal policy? I want to know how what CA learns to be useful to the federal program.

- o VL: We are required to create a work plan and submit progress reports twice a year, plus and end-of-year report. The grant is a three-year cycle, and therefore we also complete an end of cycle report. EPA makes comments on the reports. We also have quarterly meetings where we sit down and talk about what we are doing re: permitting program, enforcement, and authorization activities. CA is usually a leader and they are interested in carrying policy decision to headquarters. This is what happened with the federal e-manifest program which was modelled after California manifest program.

SH: There are probably a finite number of use cases that will be important for treating and handling used batteries. I think listing the use cases so that DTSC can provide us with specific answers would be great to better understand the complicated landscape.

7. AG Member Discussion and Policy Recommendations

Caroline Godkin:

- Thank you Valetti and DTSC
- We are moving towards a deadline to make recommendations (April 2022); how will we take this information to craft recommendations? In the coming weeks and months, we will be talking to UC Davis colleagues to start putting pen-to-paper and start coming up with recommendations.
- Now to call on everyone in turn for reflections. Especially interested in hearing from diverse nationwide/global and local perspectives that are represented on this committee.

Terry Adams:

- Comments were made earlier about subsidies in recycling programs. Manufacturers work to drive all the value out of these batteries (nickel and cobalt content) and the more they drive them down the less incentive there is to recycle; payment for EOL management will become more important, whether this is the manufacturer, a subsidy, or a deposit program.
- Battery labeling is important and is something California can mandate; they do this on other products. Chemistry and voltage will make batteries safer to handle.
- When does something become a waste? This is a question various industries have struggled with in California. DTSC likes to call everything a waste because if it's not a waste they don't have authority over it; industry doesn't want to call things a waste. We want a safe way to facilitate reuse & recycling. Clear definitions and guidance are necessary.
- Need to recognize what is already happening in California and understand that overly stringent regulation will create a pipeline of batteries going out of state.

Dan Bowerson:

- DTSC presentation was extremely enlightening; it would be very valuable to provide a use case document. Keep in mind that we are coming into a paradigm shift, we are talking about much larger Li-ion batteries with potentials for second use and regulation that applied to smaller batteries will need to be modified.
- Thanks to Alissa & team for pulling information together and providing global perspective.
- As we talk about EPR and looking forward, we need to be mindful of unintended consequences. One of the consequences he sees is adding costs negatively impacting our ability to get to the target of 100% ZEV sales.

Mark Caffarey:

- This is a global issue. I know we want to recommend regs for California, but it is a global issue.
- Universal waste is a U.S. concept; if batteries are shipped abroad, universal waste concept may not apply. State to state, does universal waste apply?
- Re: reduced nickel/cobalt content: LMO and LFP batteries will only be valued if there is reuse.

Todd Coy:

- “Just now picking myself off the floor from the last presentation.”
- Important that we operate under set standard definitions.
- Point of clarification: California Code 66273.33 which reviews activities that universal waste handler may or may not conduct on site.
- Recommendations should be based on what can and cannot happen under current regulatory structure *and* look at ways we can work with regulators to adapt rules to foster recycling and reuse in California.

Toshiya Fukui:

- LIBs in EVs are still in a regulatory grey area; most of the regulations for LIB are for smaller portable electronic batteries, which do not have the same logistics challenges as larger EV batteries. Looking at global EPR programs, the European Battery Directive is the most mature but still has not specifically addressed EV batteries, which they are working on with revisions. EV LIB recycling is a global issue, other regions are ahead in some areas, but everyone is still trying to find their way. California is different from China and Europe with its own unique challenges.
- Any program that will incur additional costs will add costs to the consumer, impacting the affordability and accessibility of EVs, as mandated by the ZEV requirement of 2035.
- My understanding is that the DTSC is open to considering unique EV LIB reuse and recycling challenges, while understanding that California must follow federal standards. Hopeful that California can develop best practices that can be adopted on a national level.

Perry Gottesfeld:

- Reiterates issue of economics of recycling; how will decreased cobalt content impact economics of recycling? We are still missing a detailed analysis of the cost of recycling and the impact of cobalt content.
- Re: labeling chemistries, there is an industry standard through color-coding and labeling chemistries. But this is a proprietary industry standard, not regulation; can we get a copy of this?

Steve Henderson:

- Thanks to presenters.
- Particularly resonated with look at global management. We don’t have to copy what folks in China and Europe do but we can be inspired by their best practices.
- This should be a win-win-win. If we do this right, we should be protecting environment and creating jobs and people’s health. Need to make sure we don’t inadvertently make this too difficult and push people to actions we want to avoid.

George Kerchner:

- Necessity of clarity and avoiding unintended consequences.
- We are in a good position to correspond with colleagues overseas about what they are doing and how they are managing LIBs.
- Conversations about classifications are important; these issues will not go away, and we want to be part of the solution.

- Flow chart would be helpful.
- Federal EPA is in the process of organizing webinars about LIBs and waste classifications for 2021, it would be good for members of this group to participate.

Bernie Kotlier:

- Thanks.
- Underscores concern about second use for stationary applications; it's become clear that there are significant impediments to second use. Hoping this committee will take on a focus on how we can reduce barriers:
 - UL Certification.
 - State/federal hazardous waste treatment regulations.
- How can committee maintain operational and toxic material safety while making this as economically viable as possible?

Jennifer Krill:

- Agree, it's been an informative day.
- Seconding what Steve said about how important it is that we utilize every tool available to us.
- Shared ownership models, leasing models, learning from examples from other industries.
- Getting this policy right will require ingenuity and creativity.
- We are working to foster safety and protection while also fostering commerce and viability in recycling and reuse.

Nick Lapis:

- Thinking about combination of Tesla announcement re: cobalt and gov's order; economics are not going to improve.
- Alternative of costs not being carried in product isn't that the costs disappear; it's that the costs are born by people who are not using the product or by taxpayers.
- Re: reuse; classifications need to be realistic and practical, there is a big difference between hazardous chemicals and battery reuse, and we should focus on this in recommendations.

Alison Linder:

- Framing conversations about used battery vehicles more broadly; what kinds of uses could cars with reduced range serve? Commuting, delivery, etc.
- Question of location—materials, manufacture, distribution is global; being explicit about goals would be useful. For example, Dr. Heinrich mentioned UK goal of keeping materials within UK. We should be explicit about which activities we want to occur within California.
- Economics—externalities should be factored into economics.
- In an ideal world we would be recycling all elements; the batteries are huge, and we should aspire to close the loop more completely.
- We need to start outlining some key policy questions without getting too in the weeds.

Geoff Niswander:

- Our recommendations need to emphasize the SAFEST PATH OF LEAST RESISTANCE in that order. To me, that's:
 - Labeling requirements for manufacturers so that regardless of where the battery is in its journey, anyone can identify what is inside it.
 - Same with universal diagnostic system (OBD); anyone should be able to figure out what is wrong with their battery pack.
- Comforted to hear that LIBs will be treated as universal waste regardless of condition or size; takes some pressure of front-end of EOL but still creates potential bottleneck for whoever is determining status of battery.
- 2030 is where RPS has grid at 60% carbon neutral; 2045 is 100% carbon neutral. He thinks California will meet this with distributed generation (paired renewables and batteries). There will be plenty of demand for stationary storage.
- Batteries without cobalt will only fall under flammability standard, assuming the TTLC and STLC thresholds for Cobalt remain the same.

Lou Ramondetta:

- Thanks.
- We don't have a lot of time between now and when we need to make recommendations.
- Still struggling with business, financial model. We are hearing about what other countries are doing but we can't forget about our current infrastructure and where we have recycling now—we need to reinvent the wheel.
- Enlightening conversation about transportation.
- Important to identify appropriate collection points.
- Next meeting should put all this together into a step 1 step 2 step 3 step 4 situation.

Courtney Smith (Read by CG):

- Leaving with new appreciation of regulatory hurdles.
- Need to take things one step at a time.
- As we move to developing recommendations, if there are opportunities to divide up the topics and have UC Davis put some ideas on paper, providing something to respond against, it would be helpful. Drafting by committee is difficult.
- Also, I remind myself that our committee doesn't have to solve this problem; we have to provide recommendations to the legislature to move the ball down the field. These may involve some calls to develop law, but also can include calls for more research, evaluate current regulatory regimes, start to develop voluntary guidelines, explore aligning existing incentives with our goals, incorporate materials availability in state planning, etc.
- Thanks to our presenters.

Teresa Bui:

- Optimistic that we can reexamine regulatory structure to find safe and cost-effective ways to manage battery collection and logistics.

Mohammed Omer:

- One thing to keep in mind is what we can change unilaterally vs. what requires U.S. EPA cooperation, in which case we may need to write up recommendations for them.

Caroline Godkin:

- Next, we will work with UC Davis team to draft an outline of final report. Don't forget we are restricted by Bagley-Keene regarding how people are allowed to meet and discuss outside public meetings.

Mohammed Omer:

- No emailed questions from the public.
- Thanks everyone for time and interest. We convened the meeting, roll call, established quorum, approved meeting minutes, discussed recent developments (bills and orders in California), presentations from Oliver Heidrich @ Newcastle University about policies in Europe; worldwide policies from Dr. Alissa Kendall; DTSC presentation from Valetti Lang and Rizgar Ghazi and discussed battery classification at different points in battery life; then members shared their takeaways.
- I will send information about December time & meeting date preferences.

CG: Thanks to everyone and meeting adjourned

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