twelve

December 3, 2022

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Internal Revenue Service
CC:PA:LPD:PR (Notice 2022-58)
Room 5203
P.O. Box 7604,
Ben Franklin Station,
Washington, D.C. 20044

The Honorable Lily L. Batchelder
Assistant Secretary for Tax Policy
United States Department of the Treasury
1500 Pennsylvania Ave., N.W.
Washington, D.C. 20220

Mr. William M. Paul
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Internal Revenue Service
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Washington, D.C. 20224

Re: Comments In Response to Notice 2022-58 Regarding Implementation of the Inflation Reduction Act and Sections 45V and 45Z

Dear Madam and Sir:

Twelve Benefit Corporation ("Twelve") respectfully submits these comments regarding section 13204 of the Inflation Reduction Act ("IRA") and in response to Notice 2022-58 regarding section 45V and section 45Z. We appreciate the opportunity to submit comments and welcome the opportunity to discuss any of these issues with you prior to the issuance of guidance or proposed regulations under sections 45V and 45Z.

About Twelve

Twelve is a chemical technology company that has developed a novel and scalable technology to convert carbon dioxide (CO2), a readily available waste gas, into valuable building blocks for chemicals and fuels. Twelve's core technology utilizes water, electricity, and CO2 as inputs, and produces chemicals such as carbon monoxide (CO) and ethylene as outputs. These outputs serve as replacements for traditional fossil fuel-derived products in the manufacturing processes for downstream products such as polycarbonate, acetic acid and Sustainable Aviation Fuel (SAF).

In some cases, Twelve integrates the additional technologies needed to make those downstream products and, in some cases, Twelve will sell its outputs, most commonly CO, to other producers. One notable application is combining Twelve's CO with hydrogen, to produce syngas, which can then be converted into SAF via gas-to-liquids synthesis. The hydrogen that that is used in this process may be purchased by Twelve from third parties or it may be produced from electrolyzers that Twelve operates alongside its CO production.

In addition to producing hydrogen from electrolyzers for use in combination with CO to make syngas, Twelve also produces hydrogen in an electrolyzer for the purpose of using the hydrogen to facilitate the production of CO. A detailed description of this process is found in the attached Appendix A.

Both uses of the green hydrogen enable the company to create a variety of low carbon fuels and chemicals, consistent with and in furtherance of the policy goals of both the Inflation Reduction Act generally and the section 45V credit specifically. These products are essential for achieving the country's goals of addressing climate change, deploying innovative clean energy technology, and creating jobs in the clean energy economy.

Section 45V

The IRA added section 45V to the Internal Revenue Code. Section 45V provides a credit for qualified clean hydrogen produced after 2022 at a qualified clean hydrogen production facility during the 10-year period beginning on the date the facility is originally placed in service.

Section 45V is a welcome addition to the Code as it will serve to stimulate the production of clean hydrogen. Hydrogen has long been recognized as an important tool in addressing some of society's most formidable carbon and climate challenges. While currently hydrogen is mainly used as a chemical in industry for oil refining and fertilizer production, it also has the potential to be an integral player in the clean energy innovation economy. Like electricity, hydrogen is a carrier for energy from any source to virtually any end use and it is made in a variety of ways. Hydrogen, which is the smallest element on the periodic table, could unlock some of the biggest energy challenges: electricity grid resilience, energy storage and, very importantly, industrial decarbonization. Twelve's innovative technology, which repurposes carbon dioxide with the use of hydrogen produced by its electrolyzer, offers the ability to take industrial decarbonization to an entirely new level.

Section 45V(e)(5) provides that the Secretary of the Treasury is to issue "such regulations or other guidance as the Secretary determines necessary to carry out the purposes of this subsection." We believe there are several points with respect to which guidance is necessary to carry out the purposes of section

45V and as to which guidance would be much appreciated. We discuss below several areas that we believe require guidance and we offer suggestions as to how guidance might address these issues.

Summary of Requests for Guidance

1. Guidance should confirm that "qualified clean hydrogen" includes hydrogen used in the process of producing other products for sale, regardless of whether the hydrogen physically becomes part of the products produced for sale.

2. Guidance should confirm that "qualified clean hydrogen" refers to hydrogen in any form, including gas, liquid, and hydrogen ions.

3. Guidance is needed to clarify the circumstances in which a single facility could qualify for both section 45V and section 45Q credits.

4. Guidance should confirm that indirect book accounting factors, such as renewable energy credits, may be considered in calculating the section 45V credit.

5. Guidance should be provided with respect to the verification requirement as to the production of clean hydrogen in the use case.

6. Guidance should clarify the circumstances in which a single facility could qualify for both section 45Z and 45V credits, if the generation of those credits is caused by distinct processing activities within the same facility.

Requests for Guidance

1. Guidance should confirm that "qualified clean hydrogen" includes hydrogen used in the process of producing other products for sale, regardless of whether the hydrogen physically becomes part of the products produced for sale.

Section 45V(c)(2)(B)(i)(III) defines "qualified clean hydrogen" as hydrogen produced "for sale *or use*" (emphasis added). Accordingly, "qualified clean hydrogen" is not limited to hydrogen that is sold; it includes hydrogen that is used and there are no conditions stated as to the nature of that use.

It would be helpful, however, if guidance confirmed that the "use" of hydrogen does not require that the hydrogen be incorporated into the product that is produced using the hydrogen. Hydrogen is used to make or produce a variety of products and not all hydrogen ends up in the sellable end-product produced. There is a range of production processes using hydrogen: (i) in some production processes, the hydrogen is entirely incorporated, becoming part of the product produced and sold; (ii) in some processes, part of the hydrogen is incorporated into the end product and part is used to effect a reaction and (iii) in some processes, the hydrogen is used to effect a reaction as a catalyst or reagent and none of it ends up in the product to be sold.

An example of the first type of process would be the common use of hydrogen to make ammonia by reacting the hydrogen together with nitrogen at high temperatures to produce ammonia (NH3). Indeed, in the case of ammonia the hydrogen is incorporated in the process; it becomes part of the product that is sold.

An example of the second type of process is the production of Fischer-Tropsch liquids, i.e. biomass-to-liquid fuels or synfuels. The production of such liquids generally involves the combination of CO with two H2 molecules to make CH2 plus H2O (water), with some of the hydrogen becoming part of the CH2 molecule and some of the hydrogen being used to separate and bond with the oxygen thereby producing the H2O by-product.

An example of the third type of process, in which the hydrogen is used to produce a product without the hydrogen becoming a part of the final product, is Twelve's production of carbon monoxide, as described in Appendix A, in which the hydrogen does not become part of the product that is sold. Instead, the hydrogen is used as a chemical reagent to effect the split of carbon dioxide into oxygen and carbon monoxide and, once so used, it ends up physically as by-product water from the reaction.

Hydrogen is essential to Twelve's production process. If clean or green hydrogen were not produced by Twelve's electrolyzer, Twelve would have to obtain hydrogen produced from less-clean sources. Since the clear intent of section 45V is to stimulate the production of clean hydrogen, it is consistent with that intent to incentivize any use of clean hydrogen, even in cases in which the hydrogen is used to produce a product that does not contain hydrogen. The use of clean hydrogen as a chemical reagent in the process of producing another product should therefore qualify as the production of qualified clean hydrogen.

Accordingly, we respectfully request guidance confirming that the definition of "qualified clean hydrogen" includes hydrogen that is used in the production process of another product regardless of whether the hydrogen becomes part of that product. In other words, we suggest that "use" be interpreted to mean use in the process of producing other products, regardless of whether the hydrogen becomes part of such other products. Such guidance might be included in the definitional portion of any guidance provided with respect to section 45V and phrased as follows[1]:

> *(a) The term "qualified clean hydrogen" shall not include any hydrogen unless such hydrogen is produced for sale or use.*
>
> *(1) Use of hydrogen. The term "use" includes use of hydrogen as a catalyst or reagent to produce another product. For purposes of determining whether hydrogen has been used, the consumption of the hydrogen into another product is immaterial.*

2. Guidance should confirm that "qualified clean hydrogen" refers to hydrogen in any form including gas, liquid, and hydrogen ions.

Guidance should confirm that "qualified clean hydrogen" can be hydrogen in any form. Hydrogen is usually thought of as a gas that at supercritical temperatures becomes a liquid. In most electrolyzers,

[1] Alternatively, consideration could be given to defining "use" in a manner similar to prior definitions of "use" with respect to chemical substances. See, for example, the definition of "use" found in Proposed Treas. Reg. section 52.4661-1(f) with respect to the imposition of Superfund excise taxes on certain chemicals stating that "A taxable chemical will be considered used when (i) it is consumed; (ii) its chemical composition is changed; or (iii) its chemical composition remains unchanged but the chemical reaction in which it plays a role would not have occurred without it." 48 Fed. Reg. 48,839 (October 21, 1983) (proposed regulations were subsequently withdrawn when section 4661 expired in 1996). See also Prop. Reg. 52.4611-1(b)(1) providing that crude oil is "used" when it is consumed, used as a catalyst, or its characteristics are changed. *Id*.

however, including that of Twelve as described in Appendix A, the hydrogen produced is a hydrogen ion, i.e., the hydrogen nucleus without an accompanying electron. Although not hydrogen in gas form (H2), hydrogen ions nevertheless should constitute the production of hydrogen for purposes of section 45V.

A number of beneficial uses of green hydrogen include the production of products using the hydrogen ions produced in an electrolyzer, not hydrogen in gas or liquid form.

Section 45V refers to "hydrogen" not "hydrogen gas" or "hydrogen atoms having a certain positive electric charge." Therefore, the production of hydrogen ions should be eligible for the credit on the same basis that the production of hydrogen gas would be eligible. Since the credit amount is based on the weight of the qualified clean hydrogen produced (kilograms of qualified clean hydrogen), to the extent that a hydrogen ion weighs less than, for example, a hydrogen molecule, it would be necessary to produce a greater amount of hydrogen ions to constitute a kilo of hydrogen than may be the case for the production of hydrogen molecules. Since both are forms of hydrogen, however, both should be considered hydrogen for purposes of the determination of "qualified clean hydrogen."

Although section 45V does not restrict "qualified clean hydrogen" to hydrogen in any form, because hydrogen can take several forms, for the avoidance of doubt, it would be helpful if guidance were to confirm all forms of hydrogen may constitute qualified clean hydrogen.

Such guidance might be included in the definitional portion of any guidance provided with respect to section 45V and could be phrased as follows:

(a) [Definition of "qualified clean hydrogen"] The term "hydrogen" means the chemical element with the atomic number 1 in all forms, gas, liquid or otherwise, including hydrogen ions and hydrogen molecules.

3. Guidance is needed to clarify the circumstances in which a single facility could qualify for both section 45V and section 45Q credits.

Section 45V(d)(2) provides: "No credit shall be allowed under this section with respect to any qualified clean hydrogen produced at a facility which includes carbon capture equipment for which a credit is allowed to any taxpayer under section 45Q for the taxable year or any prior taxable year." Similarly, section 45Z(d)(4)(D), the credit for clean fuel production, provides that a "qualified facility" does not include any facility for which the section 45V credit is allowed.

Notice 2022-58 asks in section .01(6)(c) "Are there any circumstances in which a single facility with multiple unrelated process trains could qualify for both the section 45V credit and the section 45Q credit notwithstanding the prohibition in section 45V(d)(2) preventing any section 45V credit with respect to any qualified clean hydrogen produced at a facility that includes carbon capture equipment for which a section 45Q credit has been allowed to any taxpayer?"

In response, we can affirm that there are circumstances in which section 45Q carbon capture equipment may be co-located and in geographic proximity to a clean hydrogen production facility such that they would be considered part of a "single facility" and yet be unrelated to the hydrogen production process such that it would clearly be inappropriate to restrict the ability to claim both credits.

In general, we suggest that consideration be given to providing guidance that interprets the phrase "hydrogen produced at a facility which includes carbon capture equipment for which a credit is allowed to any taxpayer under section 45Q" as meaning "hydrogen produced at a facility which includes carbon capture equipment *in the qualified clean hydrogen production process* for which a credit is allowed to any taxpayer under section 45Q." Without such an interpretation, the availability of the section 45V credit will be restricted to circumstances in which the section 45Q credit has not incentivized any activity, even an activity that is completely unrelated as a matter of production, thereby losing the opportunity to incentivize two clean energy activities with both credits.

To take a simple example, Twelve may locate one of its production plants on a parcel of land directly adjacent to an unrelated industrial emitter of CO2, such as a pulp and paper production facility. The industrial emitter is incentivized to install a CO2 carbon capture system because of the potential for a section 45Q credit with respect to such captured CO2. Twelve will purchase the captured CO2 for production of its CO, which, as described above, is combined with hydrogen to make fuels or other products. However, even though the carbon capture is co-located with the hydrogen production, the CO2 is not used in the generation of clean hydrogen by the electrolyzer, and it is not a by-product of the clean hydrogen production process. In such circumstances, it is readily apparent that it would be inappropriate to disallow a section 45V credit for Twelve simply because its electrolyzer is adjacent to a process that captures CO2 for use in the production of products downstream from Twelve's clean hydrogen production. Allowance of both credits implements the legislative intent to incentivize each of the activities in which the taxpayers are engaged.

In a variation on the above example, instead of being co-located with an industrial emitter of CO2, Twelve may locate its production plants adjacent to direct air capture plants in order to have immediate access to the CO2 removed from the atmosphere by the direct air capture. The CO2 removal that is accomplished by the direct air capture plant is incentivized by availability of a section 45Q credit. However, the CO2 is not used in the generation of the clean hydrogen and is not captured as a by-product of the clean hydrogen production. Allowing the section 45V credit as well as the section 45Q credit in such circumstances incentivizes two separate activities, each of which is clearly intended to be incentivized. Therefore, unless the prohibition on claiming both credits is clarified to mean credits claimed with respect to carbon capture equipment *in the hydrogen production process*, the direct air capture activity would not be incentivized.

In contrast to the above examples, in the case of the production of blue hydrogen, i.e., the steam reformation of hydrogen followed by capture of the accompanying carbon dioxide emissions, the capture of the carbon is part of the production process for the hydrogen. It would certainly be taken into account by the taxpayer in calculating the carbon intensity of the hydrogen production process for purposes of determining the amount of the section 45V credit. In this case, only one incented activity is being performed -- the production of clean hydrogen – and thus allowing both credits would reward one activity doubly. In the examples above, however, allowing both credits to be claimed incentivizes two separate activities.

Clearly, there are situations in which carbon capture or clean fuel production may be happening at the same facility as the clean hydrogen production, but which do not relate to the clean hydrogen production. In such situations, claiming both credits is not a doubling up, or "stacking," of the credits for one incented activity but, rather, it is the appropriate claiming of credits designed to incentivize each of two separate activities. In order to limit the prohibition on claiming both credits to situations in which the

taxpayer is engaging in a single incented activity, Twelve respectfully proposes the prohibition be interpreted to mean "hydrogen produced at a facility which includes carbon capture equipment *in the qualified clean hydrogen production process* and for which a credit is allowed to any taxpayer." Such guidance might read as follows:

(a) *Coordination with credit for carbon oxide sequestration. No credit shall be allowed under section 45V with respect to any qualified clean hydrogen produced at a facility which includes carbon capture equipment for which a credit is allowed to any taxpayer under section 45Q for the taxable year or any prior taxable year. For purposes of this rule, the presence of carbon capture equipment at a facility shall be ignored unless such carbon capture equipment is used in the process of production of the qualified clean hydrogen*.

4. Guidance should confirm that indirect book accounting factors, such as renewable energy credits, may be considered in calculating the section 45V credit.

In section 3.01(4)(f) the Notice asks: "Should indirect book accounting factors that reduce a taxpayer's effective greenhouse gas emissions (also known as a book and claim system), including, but not limited to, renewable energy credits, power purchase agreements, renewable thermal credits, or biogas credits be considered when calculating the section 45V credit?"

Allowing market-based mechanisms to align low-carbon energy sources with clean hydrogen production is critical to development of clean hydrogen production in the United States. It is clear that many clean hydrogen production facilities do not have availability of low- or zero-carbon power sources in the locations in which they operate, and they are forced to buy power from the grid. In such instance, market-based mechanisms provide a way for a producer to implement a clean energy power source which will in turn create more demand for, and the development of more, renewable power sources. Likewise, without the flexibility of such market-based mechanisms, we will likely see delays in the development of clean hydrogen facilities as they wait for clean energy projects to come online at or near their location.

Twelve intends to use market-based mechanisms to fulfill its commitment to clean energy. Aligning that use with the analysis of the carbon intensity of its operations for purposes of calculating the section 45V credit will serve to further the cause of development of clean energy resources broadly in the United States.

On this point, Twelve endorses the comments filed in response to Notice 2022-58 by the Fuel Cell and Hydrogen Energy Association (FCHEA), including within an Appendix thereto, their response on this point to the DOE's draft Clean Hydrogen Production Standard.

5. Guidance should be provided with respect to the verification requirement as to the production of clean hydrogen in the use case.

Notice 2022-58 asks in section 3.01(4)(e):

"If a taxpayer serves as both the clean hydrogen producer and the clean hydrogen user, rather than selling to an intermediary third party, what verification process should be put in place (for example, amount of clean hydrogen utilized and guarantee of emissions or use of clean electricity) to demonstrate that the production of clean hydrogen meets the requirements for the section 45V credit?"

In Twelve's process, as described in Appendix A, the hydrogen is produced in the electrolyzer and then it is used *in situ*, i.e., it is used inside of the same equipment to assist in the splitting of carbon dioxide into oxygen and carbon monoxide. It bonds with the oxygen to form water which is then expelled from the equipment. Therefore, the hydrogen that is used in this process is not isolated, emitted or accumulated as such outside of the equipment and its production cannot be directly observed. Nevertheless, it is possible to determine exactly how much hydrogen has been produced by calculation from the amount of the outputs from the reactor (in this case, by proxy from the output of O2).

We therefore recommend that the verification process for hydrogen that is used consist of certification by an engineer or other such technical professional who holds the relevant qualifications, as to the amount of clean hydrogen produced based on either observation of production amounts or derivation of production amounts based on a calculation of the inputs, the amounts of which have been certified by the engineer, and the outputs, the amounts of which have also been certified by the engineer.

Guidance in this regard might read as follows:

(a) Verification. The production and sale or use of hydrogen must be verified by an unrelated party. Such verification shall be performed by an engineer or other such technical professional who holds the relevant qualifications and may be based on direct observation or readings of production amounts or on calculations that derive the production and use amounts based on the inputs and outputs of the production process, both of which have also been certified by the engineer.

6. Guidance should clarify the circumstances in which a single facility could qualify for both section 45Z and 45V credits, if the generation of those credits is caused by distinct processing activities within the same facility.

Notice 2022-58, in section 3.02(7), calls for comments on any other topics related to the section 45Z credit that may require guidance.

Section 45Z(d)(4)(B) provides that a "qualified facility" does not include a facility for which one of the following credits is allowed under section 38 for the taxable year: (i) the credit for production of clean hydrogen under section 45V; (ii) the credit determined under section 46 to the extent that such credit is attributable to the energy credit determined under section 48 with respect to any specified clean hydrogen production facility for which an election is made under subsection (a)(15) of such section; or (iii) the credit for carbon oxide sequestration under section 45Q.

We suggest that guidance clarify the circumstances in which a single facility might be considered a qualified facility for purposes of section 45Z despite the allowance to that facility of the credits listed in section 45Z(d)(4)(B).

The issue presented here is similar to the issue discussed above that is presented by section 45V(d)(2) which disallows a section 45V credit if the facility includes carbon capture equipment for which a section 45Q credit is allowed. However, as we described above with respect to the issue for section 45V, there are circumstances in which a single facility may be comprised of multiple process trains or equipment that should be treated as separate facilities for purposes of applying the prohibition on multiple credits for a single facility.

An example of a situation relevant for purposes of section 45Z would be a clean fuel production facility that, rather than purchasing carbon monoxide as a feedstock from an offsite provider, produces it on site. This is the case with Twelve's production process. The carbon monoxide production process includes the production of green hydrogen to be used as a chemical reagent to implement the carbon monoxide production. Without the section 45V credit, Twelve would have no incentive to use green hydrogen in its CO production process; it could purchase and use less clean hydrogen for the same purpose. Similarly, if the section 45Z credit is not available because the section 45V credit is claimed, the fuel producer would not be incentivized to produce clean fuel.

We suggest that guidance clarify that the production of feedstocks for the clean fuel production process are not intended to be treated as part of the same facility as the clean fuel production process for purposes of determining whether one of the listed credits is claimed for the same facility. In the example above, the green hydrogen production process is used to create a feedstock (carbon monoxide) for the syngas and clean fuel (SAF) that is produced. The clean fuel producer has an ability to obtain its feedstock from green or "clean" sources or other sources that are less clean. Disallowing the section 45Z clean fuel production credit because the feedstock is derived from a co-located process that is eligible for the section 45V credit disincentivizes the clean fuel producer from obtaining the feedstock from clean sources. In order to incentivize both activities, i.e., both the production of feedstock through the production of green hydrogen and the production of clean fuel itself, it is appropriate to treat these activities as not occurring at a single facility.

Prohibiting both credits in this situation disincentivizes at least one activity. If the taxpayer claims the section 45Z credit for clean fuel production, it would have no incentive to use feedstock (carbon monoxide) derived by using green hydrogen as part of the process. Similarly, if the taxpayer is restricted to claiming the section 45V credit for the green hydrogen production, it would not be incentivized to use that hydrogen in the production of clean fuel since it would have no opportunity to obtain a section 45Z credit.

We believe that in order to best incentivize the production of clean fuels a single facility should be treated as multiple, separate facilities for purposes of application of the definition in section 45Z(d)(4) when the credits claimed relate to the process of producing feedstocks to the clean fuel production process.

Guidance in this regard could read as follows:

(a) The term "qualified facility" does not include any facility for which one of the following credits is allowed under section 38 for the taxable year: (i) the credit for production of clean hydrogen under section 45V. For purposes of this rule, allowance of a credit under section 45V shall not disqualify a facility if such credit is allowed with respect to the production of qualified clean hydrogen in connection with the production of a feedstock for the clean fuel produced at the qualified facility.

* * * * *

We appreciate the opportunity to submit these comments and are available to discuss these issues in greater detail or answer any questions you may have.

Respectfully Submitted,

DocuSigned by:

By: _____
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Att: Appendix A - Description of Twelve's Production Process

Appendix A

Description of Twelve's Hydrogen and Carbon Monoxide Production Processes

In addition to making hydrogen for use in downstream products, Twelve also makes hydrogen that is used in Twelve's production of CO.

Function of Hydrogen in the Carbon Monoxide Production Process.

Twelve produces CO by splitting CO2 into oxygen and CO using its proprietary catalyst. In order to effect the split, hydrogen must be available to bond with the oxygen that results from the split. The hydrogen plays an essential role in the production of the CO because, but for the presence of the hydrogen, the oxygen would immediately reattach to the CO to re-form into CO2. When the hydrogen joins with the oxygen, it creates H2O (water) which is discharged as an innocuous and inert waste.

The hydrogen functions as a chemical reagent that is consumed in the process by bonding with oxygen to create water. Thus, the hydrogen is used in the production of a product, CO, but that product does not itself contain hydrogen. Even so, hydrogen plays an important role in Twelve's production of CO. If Twelve did not produce hydrogen for this purpose by using an electrolyzer as described below, it would still have to obtain hydrogen for use in its CO production process from some source.

Production of Hydrogen for Use in Carbon Monoxide Production.

Twelve operates an electrolyzer to produce the hydrogen used for this purpose. The anode side of the electrolyzer uses electricity to cause the split of the H2O molecule into hydrogen and oxygen. The hydrogen produced from this split is, as is the case with electrolyzers, a hydrogen ion. The hydrogen ion then passes through a membrane to the cathode side of the electrolyzer.[2]

The hydrogen produced by Twelve's electrolyzer is not discharged from the electrolyzer as hydrogen gas. Instead, after passing through the membrane to the cathode side of the electrolyzer and while still in the reactor, it is used as described above to bond with oxygen produced from the splitting of the CO2 molecule.

The hydrogen that is used in this process is not isolated, emitted or accumulated as such outside of the equipment. The amount of hydrogen produced is measured by a mass balance calculation from the amount of the outputs from the reactor (in this case, by proxy from the output of O2, the oxygen with which the hydrogen bonds).

[2] Twelve's electrolyzer operates similarly to most electrolyzers in producing hydrogen ions. See the description of the production of hydrogen by electrolyzers provided by the Hydrogen and Fuel Cell Technologies Office of the Department of Energy, available at: https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis . See also https://www.h2bulletin.com/knowledge/hydrogen-production-through-electrolysis/.