

To operate a 1-megawatt (MW) hydrogen power plant for one day (24 hours), you first need to determine the total energy output required:  $1 \text{ MW} \times 24 \text{ hours} = 24 \text{ megawatt-hours (MWh)}$ , which equals 24,000 kilowatt-hours (kWh). Hydrogen has an energy content of about 33.33 kWh per kilogram (kg). Assuming 100% conversion efficiency (which is idealized; real systems are less efficient), the minimum hydrogen required would be:

- $24,000 \text{ kWh} \div 33.33 \text{ kWh/kg} \approx 720 \text{ kg}$  of hydrogen per day.

In practice, accounting for system inefficiencies (such as fuel cell or turbine efficiency, typically around 50-60%), the actual hydrogen required could be higher—potentially in the range of 1,200 to 1,400 kg per day for a 1 MW power plant running continuously.

to calculate the amount of hydrogen needed, we have to look at the energy density of hydrogen and the efficiency of the system converting it into electricity.

### 1. Total Energy Required

First, we calculate the total energy output needed for the day:

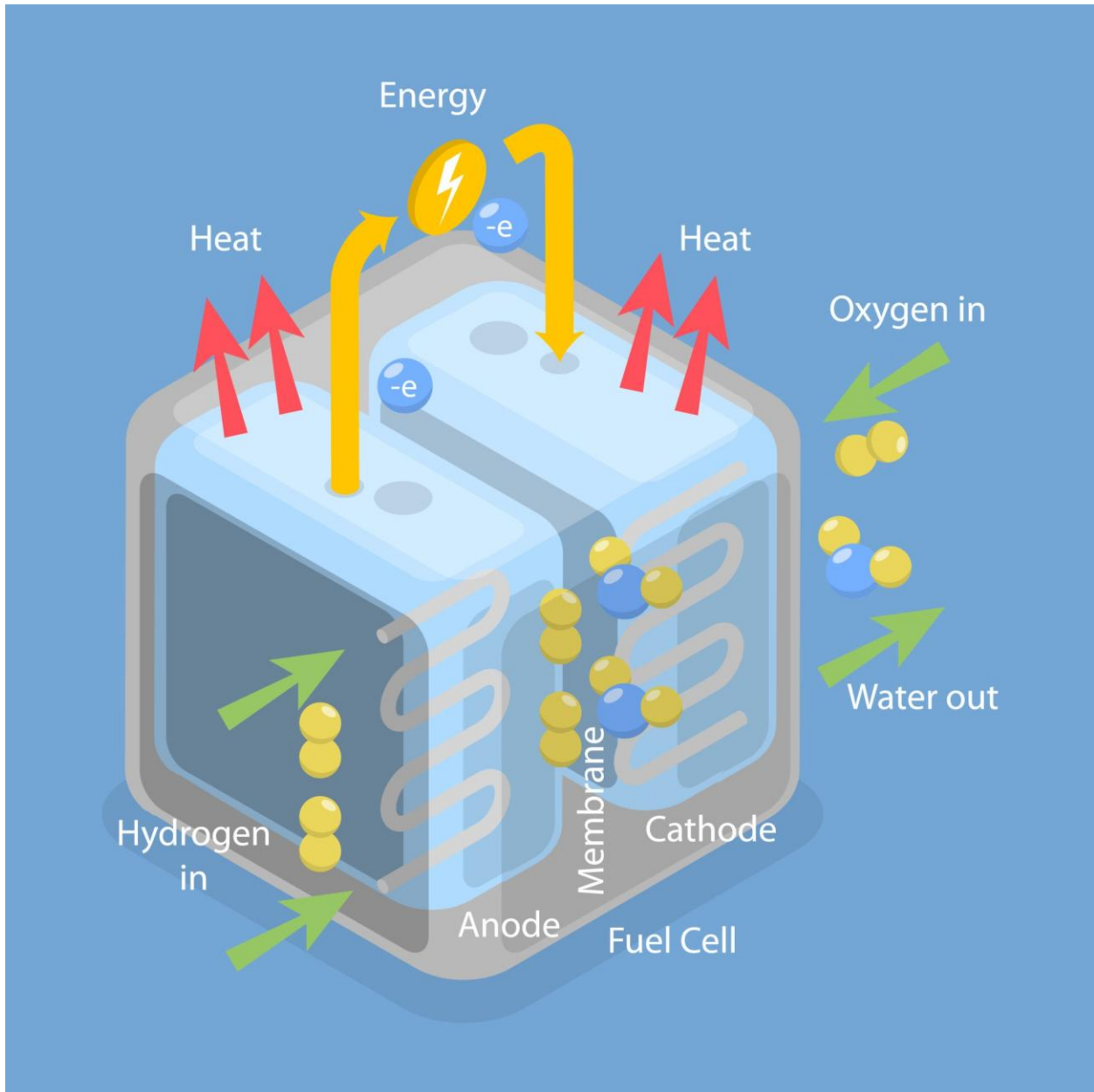
- **Power ():** 1 MW ( kW)
- **Time ():** 24 hours
- **Total Energy ():** 24,000 kWh

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### 2. The Conversion Factor

Hydrogen has a Lower Heating Value (LHV) of approximately **33.3 kWh per kg**. However, no power plant is 100% efficient. Most modern stationary hydrogen fuel cells operate at about **50% to 60% efficiency**.

If we assume a standard efficiency of **50%**, you actually need enough hydrogen to produce 66.6 kWh of raw thermal energy to get 33.3 kWh of electricity.



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### 3. The Calculation

Using the 50% efficiency estimate:

- **Effective Energy per kg:**
- **Total Hydrogen Needed:**

Efficiency Rate                      H2 Required (approx.)

**40%** (Combustion Turbine) 1,800 kg

**50%** (Standard Fuel Cell) 1,441 kg

**60%** (High-Efficiency Cell) 1,200 kg

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## Summary

To run a 1 MW plant for 24 hours, you will need roughly **1.4 to 1.5 metric tons** of hydrogen.

To put that in perspective, a standard large tube trailer carries about 300–500 kg of compressed hydrogen, so you'd need about **three to four full deliveries** every single day to keep the lights on.

Would you like me to calculate the volume this would occupy at specific pressures (like 350 or 700 bar) so you can visualize the storage size?

To produce the **1,440 kg** of hydrogen needed for a day's operation of a 1 MW power plant using electrolysis, you would need a significant amount of water.

The calculation is based on the chemical formula for water ( $H_2O$ ), where 2 hydrogen atoms and 1 oxygen atom are split.

### 1. Theoretical Water Requirement

In a perfect chemical reaction:

- **The Ratio:** For every **1 kg** of hydrogen, you need approximately **8.94 kg** (liters) of water.
- **Calculation:**  $1,440 \text{ kg} \times 8.94 = \mathbf{12,869 \text{ liters}}$

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### 2. Practical Raw Water Requirement

In a real-world setting, you cannot use tap water directly. Electrolyzers require ultra-pure, de-ionized water. The purification process (like Reverse Osmosis) produces a "reject" stream of wastewater containing minerals.

Additionally, some water is lost through system cooling and evaporation. Most industrial electrolyzer systems consume about **12 to 15 liters** of raw water per 1 kg of hydrogen produced.

Type	Amount Required (for 1,440 kg H <sub>2</sub> )	Visual Comparison
Pure H <sub>2</sub> O (Theoretical)	12,869 liters (3,400 gal)	About 2/3 of a standard backyard swimming pool
Raw Water (Practical)	16,730 liters (4,420 gal)	Almost a full 5,000-gallon tanker truck

### 3. Summary of Daily Operations

To keep a **1 MW** hydrogen power plant running for **24 hours** using water as your source:

1. **Water Input:** You would draw about **16.7 cubic meters (16,730 liters)** of water from a source.
2. **Processing:** An electrolyzer would use roughly **50–55 MWh** of electricity (at 70-80% electrolyzer efficiency) to split that water.
3. **Result:** You get **1,440 kg of H<sub>2</sub>** and about **11,500 kg of Oxygen** (which is often vented into the air or sold as a byproduct).
4. **Generation:** That hydrogen is then fed into your fuel cell to produce the **24 MWh** of electricity for your plant.

**Note on Efficiency:** Notice that it takes about **50+ MWh** of electricity to produce the hydrogen, only to get **24 MWh** back out of the power plant. This is why hydrogen is primarily used for **energy storage** (storing excess wind/solar power) rather than as a primary fuel source itself.

At 1 bar of pressure (which is roughly atmospheric pressure at sea level) and a temperature of  $15^{\circ}\text{C}$ , hydrogen gas is extremely diffuse.

To store the **1,440 kg** of hydrogen required to run your 1 MW plant for 24 hours, you would need an immense amount of space:

### 1. The Calculation

- **Density of  $\text{H}_2$  at 1 bar:**  $\approx 0.084 \text{ kg/m}^3$
- **Total Volume Required:**  $1,440 \text{ kg} / 0.084 \text{ kg/m}^3 = \mathbf{17,114 \text{ m}^3}$

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### 2. Physical Visualization

Storing hydrogen at 1 bar is almost never done because of the massive footprint required. To give you an idea of how big **17,114 cubic meters** is:

- **Olympic Swimming Pools:** It would fill approximately **6.8 Olympic-sized swimming pools** (assuming a standard volume of  $2,500 \text{ m}^3$  per pool).
- **Hot Air Balloons:** It is roughly the volume of **6 to 7 standard hot air balloons**.
- **Residential Houses:** It would fill about **28 average-sized American suburban homes** (assuming  $\sim 600 \text{ m}^3$  of interior volume per house).
- **The "Hindenburg" Factor:** For historical context, the Hindenburg airship held about  $200,000 \text{ m}^3$  of hydrogen. Your daily requirement is about **8.5% of the total gas volume** of the Hindenburg.

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### 3. Summary Comparison

This table shows how dramatically the volume shrinks as you increase the pressure:

Pressure	State	Volume Required	Visual Scale
<b>1 bar</b>	Gas	<b><math>17,114 \text{ m}^3</math></b>	A small neighborhood of houses
<b>350 bar</b>	Compressed Gas	<b><math>61.8 \text{ m}^3</math></b>	A 40-foot shipping container
<b>700 bar</b>	Compressed Gas	<b><math>36.3 \text{ m}^3</math></b>	A large delivery truck

Pressure	State	Volume Required	Visual Scale
N/A	Liquid ( $-253^{\circ}\text{C}$ )	$20.3 \text{ m}^3$	A standard fuel tanker

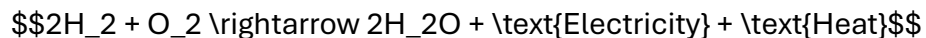
Because of this "1 bar" volume, hydrogen is always compressed or liquefied for storage. Storing it at 1 bar would require a massive "gasometer" (the giant telescopic tanks used for city gas in the 19th century), which would be impractical and a significant safety hazard for a modern power plant.

You've hit on the most poetic part of the hydrogen cycle: **the process is a closed loop.**

The short answer is **yes**, but with a slight catch regarding efficiency and evaporation.

### 1. The Chemistry (The "New" Water)

When you run a hydrogen power plant (specifically a fuel cell), the hydrogen doesn't just disappear. It combines with oxygen from the ambient air to create electricity, heat, and **pure water vapor.**



Chemically, for every **1 kg** of hydrogen you burn/process, you create exactly **8.94 kg** of "new" water.

- **Hydrogen Input:** 1,440 kg
- **Water Output (Theoretical):**  $1,440 \times 8.94 \approx 12,874 \text{ liters}$  (**3,401 gallons**)

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### 2. Why it isn't quite 5,000 gallons

While you started with roughly **4,420 to 5,000 gallons** of "raw" water to produce that hydrogen, the fuel cell only "recovers" the pure chemical portion of the water ( $\text{H}_2\text{O}$ ).

The "missing" volume in your 5,000-gallon estimate comes from two places:

1. **The Filter Waste:** To make the hydrogen, you had to throw away about 20–30% of your source water because it contained minerals (calcium, salt, etc.) that would ruin an electrolyzer. That "reject water" never made it into the hydrogen.
2. **The Exhaust:** In most power plants, the water comes out of the tailpipe as **hot steam/vapor**. To actually "get" the 3,401 gallons back in liquid form, you would need a massive condenser (like a giant radiator) to cool the steam back into a liquid.

### 3. The "Water Balance" Summary

Stage	Amount	Notes
<b>Step 1: Raw Water Intake</b>	<b>~4,420 gal</b>	What you pull from a well or city line.
<b>Step 2: After Purification</b>	<b>~3,400 gal</b>	The ultra-pure water that actually gets split.
<b>Step 3: Power Generation</b>	<b>~3,400 gal</b>	The "New" water created as exhaust.

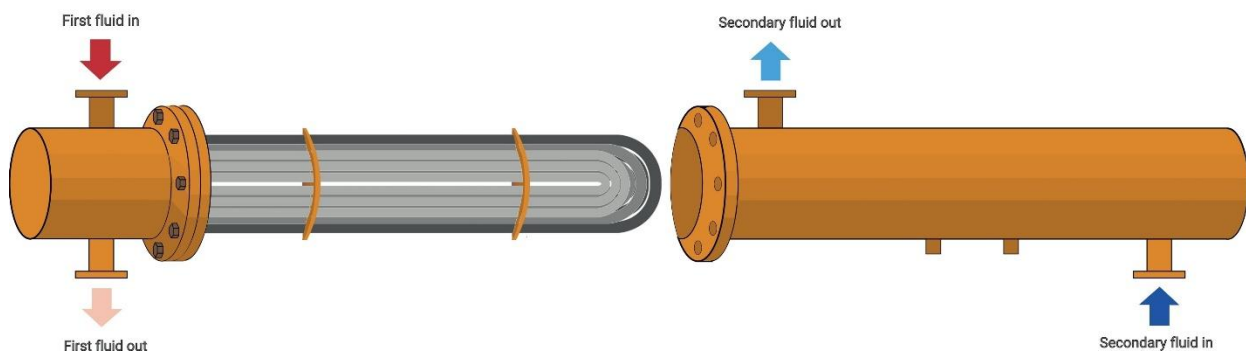
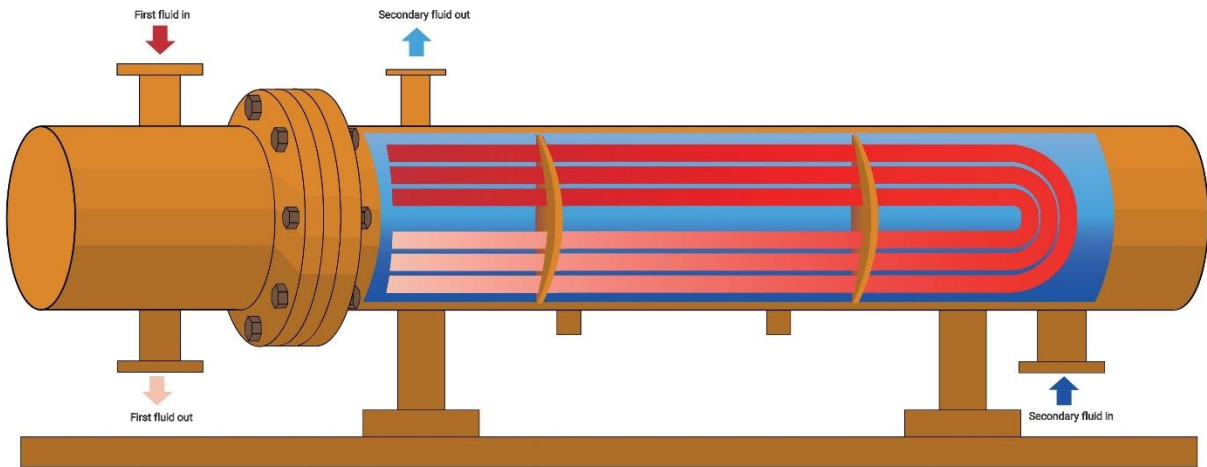
**The Result:** You don't get 5,000 gallons back, but you do get back roughly **100% of the pure water** you used to make the fuel. In theory, if you captured all that exhaust and cooled it down, you could pipe it right back to the start of the process and use it to make more hydrogen!

To capture that water vapor and turn it back into liquid, you need a **Condenser System**. This is essentially a giant radiator that cools the exhaust from the fuel cell or turbine.

#### 1. The Energy Behind the Water

When the hydrogen and oxygen combine, they don't just make water; they release a massive amount of **thermal energy**.

- The exhaust temperature from a high-temp fuel cell or a hydrogen combustion turbine can exceed **\$500<sup>^</sup>\circ C\$ to \$600<sup>^</sup>\circ C\$**.
- To get your **3,400 gallons** of liquid water back, you have to strip away all that heat until the steam drops below **\$100<sup>^</sup>\circ C\$** and condenses.



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## 2. The Cooling Requirement

To condense 12,874 liters (3,400 gallons) of water per day, your cooling system has to work hard.

- **The Math:** It takes about  $2,260 \text{ kJ}$  of energy to condense just  $1 \text{ kg}$  of steam into water.
- **Total Heat Removal:** For 1,440 kg of  $H_2O$  turning into water, you'd need to remove roughly  $29 \text{ Gigajoules}$  of heat daily just for the phase change (steam to liquid).

## 3. Combined Heat and Power (CHP)

Instead of just "venting" that heat to the atmosphere to get your water back, most efficient plants use a **Combined Heat and Power** setup.

- The "waste" heat is used to provide hot water or space heating for nearby buildings.

- By the time the heat has been "used" by the buildings, the steam has cooled down naturally, turning back into liquid water that can be collected in a tray at the bottom of the system.

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### Is it "Drinking Water"?

Technically, the water coming out of a hydrogen fuel cell is **distilled water**. It is incredibly pure—too pure, in fact.

- **The Catch:** Because it lacks minerals (like calcium and magnesium), it can actually be "aggressive" and leach minerals out of metal pipes or even your body if you drink it exclusively.
- **The Fix:** If you wanted to use that 3,400 gallons for a local community, you would run it through a "re-mineralization" filter to make it taste like normal spring water.

### Summary of the "Water Loop"

1. **Electrolyzer:** Consumes **electricity + 4,420 gal raw water**  $\rightarrow$  produces **1,440 kg  $H_2$** .
2. **Power Plant:** Consumes **1,440 kg  $H_2$**   $\rightarrow$  produces **24 MWh electricity + 3,400 gal steam**.
3. **Condenser:** Cools the steam  $\rightarrow$  recovers **3,400 gal liquid water**.

To run a 1 MW hydrogen power plant for 24 hours in 2026, the economics are as much about the "energy tax" of physics as they are about the cost of water and gas.

Here is the daily "bank statement" for your power plant.

#### 1. Daily Operating Costs (2026 Estimates)

Because you are likely using an electrolyzer to turn water into fuel, your biggest cost isn't water—it's the electricity used to split it.

Item	Quantity	Estimated Unit Cost	Daily Total
<b>Electricity (to make \$H_2\$)</b>	73,440 kWh	\$0.08 / kWh (Industrial)	<b>\$5,875</b>
<b>Raw Water</b>	4,420 Gallons	\$0.01 / Gallon (Avg)	<b>\$44</b>
<b>Water Purification (DI)</b>	4,420 Gallons	\$0.05 / Gallon (Filters/Resin)	<b>\$221</b>
<b>Maintenance (OpEx)</b>	Fixed	~3% of CapEx/year	<b>\$410</b>
<b>Total Daily Cost</b>			<b>\$6,550</b>

**The Reality Check:** You spend about **\$6,550** to produce 24 MWh of electricity. If you sold that electricity back to the grid at the 2026 average industrial rate (~\$0.14/kWh), you'd make **\$3,360**. Without government subsidies (like the \$3/kg production tax credit), running this plant is currently a net loss.

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## 2. The Infrastructure: What you need on-site

To handle these volumes daily, your 1 MW plant would require:

- **The Electrolyzer:** A 3 MW unit (to produce enough \$H\_2\$ in 24 hours to power the 1 MW fuel cell).
- **The Purifier:** A Reverse Osmosis (RO) and De-ionization (DI) skid capable of processing 200 gallons per hour.
- **The Storage:** A "buffer tank" at 350 bar (the size of a shipping container) to hold at least 1,500 kg of gas so the plant doesn't shut down if the electrolyzer fluctuates.
- **The Condenser:** A cooling tower capable of shedding **29 Gigajoules** of heat daily to recover that "new" water.

## 3. The Water Recovery "Discount"

If you capture the 3,400 gallons of exhaust water, you can recycle it.

- **Benefit:** You reduce your daily water bill by about **\$30-\$50**.
  - **Hidden Value:** The recovered water is already distilled. This saves you roughly **\$150/day** in filtration and resin costs because the water is already "clean" for the next round of electrolysis.
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## Summary of the Cycle

You start the day with **4,420 gallons of water** and **73 MWh of electricity**. By the end of the day, you have produced **24 MWh of power** for your customers and recovered **3,400 gallons of pure water** to start the process over again tomorrow.

To give you an accurate answer, it's important to clarify which "Vivify" you are looking for, as there are several companies with very similar names. Depending on whether you are looking at them as a potential employee, a software user, or a business partner, here is the breakdown of the most prominent ones:

### 1. Vivify Technologies (IT & Software Modernization)

This is likely the "Technology Corporation" you're referring to. They specialize in transforming legacy software (like PowerBuilder or Visual Basic) into modern web applications.

- **The Verdict:** They are a **legitimate, specialized firm** with roots in Nexaweb Technologies.
- **Reputation:** They are generally well-regarded for their niche expertise in "MDT" (Model Driven Transformation).
- **Keep in mind:** Because their work is highly technical and B2B, you won't find many "consumer" reviews, but they are a stable entity in the IT modernization space.

### 2. Vivify Health (Remote Patient Monitoring)

A major player in healthcare technology, now owned by **Optum** (UnitedHealth Group).

- **The Verdict:** Very "okay"—in fact, they are a **market leader** in remote patient care.
- **Pros:** Highly rated for their "Pathways" software and clinical integration.
- **Cons:** As with many large healthcare platforms, some users find the interface can be complex, and clinical implementation requires significant training.

### 3. VivifyScrum (Agile Project Management)

A popular software-as-a-service (SaaS) tool for agile teams.

- **The Verdict: Highly rated.** It's often cited as a great, cost-effective alternative to Jira for smaller teams.

- **User Feedback:** It holds high scores (around **4.4/5**) on sites like Capterra and G2 for its ease of use and "clean" interface, though some find the mobile app lacking compared to the desktop version.

#### 4. Vivify Venues (School & Community Space Hire)

A UK-based company that manages the booking of school facilities for local sports and events.

- **The Verdict: Mixed.** While they provide a valuable service, they have seen some negative reviews on Trustpilot regarding strict cancellation policies and occasional staffing issues at specific sites.

#### Summary Table

Company	Primary Focus	General Reputation
<b>Vivify Technologies</b>	IT Modernization	Professional / Specialized
<b>Vivify Health</b>	Healthcare RPM	Strong / Enterprise-grade
<b>VivifyScrum</b>	Project Management	High / Great for small teams
<b>Vivify Venues</b>	Facility Management	Average / Mixed customer service

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**Would you like me to look into a specific job opening, or are you considering using one of their software products?**

**Nexaweb Technologies** is essentially the "parent" or predecessor of Vivify Technologies. If you are looking at Nexaweb, you are likely looking at a company that is currently in a "maintenance and legacy" phase of its lifecycle.

Here is the breakdown of the company as of 2026:

#### 1. Relationship to Vivify

Vivify Technologies was spun off from Nexaweb to focus specifically on **modernization services** (taking old code and making it new). Nexaweb, meanwhile, remains the entity behind the original **Nexaweb Platform** and the newer **Nexacro** platform.

## 2. Is it an "OK" Company?

The answer depends on what you need from them:

- **For Job Seekers:**
  - **The Vibe:** Employee reviews (on sites like Indeed and Glassdoor) consistently describe it as a "**relaxed**" and "**low-stress**" environment.
  - **The Catch:** Some former employees note that because the company focuses heavily on maintaining older enterprise software, there isn't always a high level of innovation or fast-paced career growth. It is generally considered a stable, "punch-the-clock" kind of workplace rather than a high-growth tech startup.
- **For Businesses (Software Quality):**
  - **Specialization:** They are very good at what they do—specifically helping banks and large enterprises move legacy Java or PowerBuilder apps to the web.
  - **Status:** While they aren't "cutting edge" in the way an AI startup is, their **Nexacro Platform** is a solid, professional-grade tool for building enterprise-level UI that works across desktop and mobile from one code base.

## 3. Financial & Operational Stability

Nexaweb has been around since 2000 and is headquartered in Burlington, MA. While it is a smaller private company (estimated around 15–50 employees depending on the branch), it has a long history of serving high-stakes clients in financial trading and government.

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### Summary Table: Nexaweb at a Glance

Category	Rating	Notes
Stability	High	25+ years in business; reliable enterprise niche.
Innovation	Moderate	Focused on "modernizing the old" rather than "inventing the new."
Work Culture	Chill	Good work-life balance; may feel "slow" for ambitious juniors.

Category	Rating	Notes
Product Support	Solid	Known for high-performance messaging (Internet Messaging Bus).

The main corporate site for the group. It focuses on their high-performance enterprise platforms and their partnership with TOBESOFT.

- **Website:** [nexaweb.com](http://nexaweb.com)
- **Key Product: Nexacro**, a platform for building apps that run on mobile and web from a single codebase.

## 2. Vivify Technologies

The spin-off specifically focused on **modernization services**. If you are looking to transform old "legacy" code (like PowerBuilder or VB6) into modern web apps, this is their specific arm.

- **Website:** [vivifytechnologies.com](http://vivifytechnologies.com)
- **Core Approach:** They use "Model Driven Transformation" (MDT) to automate the migration of old software.

## 3. The Nexacro Platform (Developer Docs)

If you are a developer looking for technical manuals, guides, or the "Nexacro N" low-code environment, they use a centralized documentation library.

- **Website:** [docs.tobesoft.com](http://docs.tobesoft.com)

## About

Vivify Technologies transforms PowerBuilder, Visual Basic and other client server applications into modern web solutions. Vivify's MDT Framework, based upon our model driven development approach to application modernization, minimizes risk and maximizes return on investment. Vivify is a spin out of Nexaweb Technologies, a leader in application

modernization that has completed over 400 modernization projects for more than 200 Fortune 2000 companies.

Leadership team



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