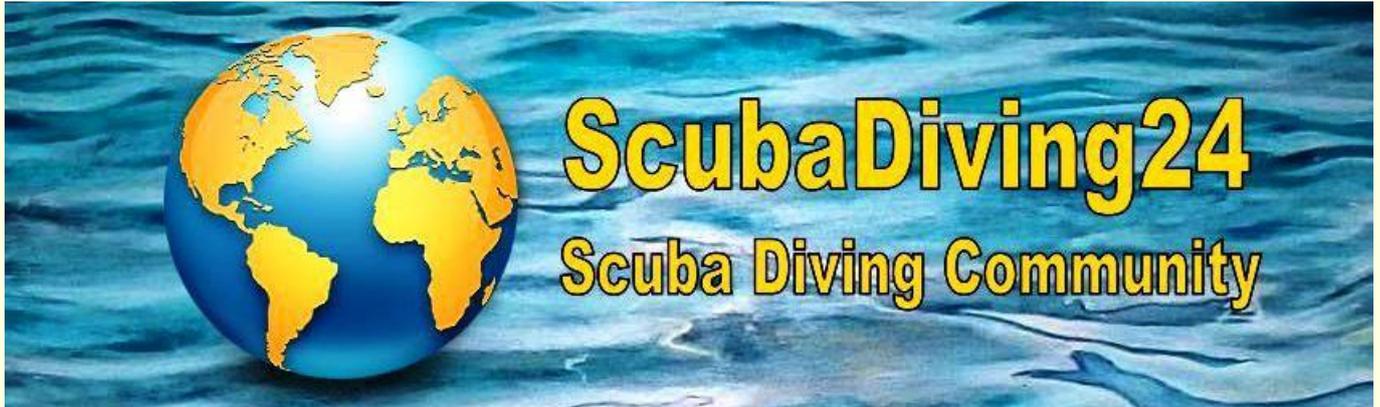


– Saving Air while Scuba Diving –



Do you consistently run through your gas supply faster than other divers on the boat? Do you frequently have to end the dive before the rest of the group? What's going on? And what can you do about it?

You can stop beating yourself up over it. People are different. Those with slower metabolisms will — other factors being equal — use less oxygen. Small divers have to use less energy than big ones to swim forward, so they also use less oxygen. Nature doesn't distribute her gifts equally, and you may never be the stingiest sipper of gas on the boat.

On the other hand, most of us can reduce our gas consumption and thereby extend our dives. We can be better, even if we can't be the best. Typically, divers waste air in one or more of these three ways:

- By leaking it before it gets to their lungs, thanks to free-flowing octos and worn out O-rings.
- By using more energy than necessary. Using energy means using air, because oxygen is necessary to burn the calories that make energy. Every bit of unnecessary exertion costs you psi respectively bar.
- By getting less than maximum benefit from each breath. When divers breathe inefficiently, they exchange less oxygen for carbon dioxide with each breath, so they need to take another breath sooner.

1. Fix the Small Leaks

Even a tiny stream of bubbles from an O-ring or an inflator swivel adds up over 40 minutes, and may be a sign of more serious trouble ahead anyway. You don't think you have leaks? Do you have eyes in the back of your head? Ask your buddy to look behind you to be sure. A mask that doesn't seal is another kind of leak in that you have to constantly blow air into it to clear out the water. It's also a source of stress, which needlessly elevates your breathing rate and thereby reduces your breathing efficiency. Does your octo free-flow easily? That can dump a lot of air quickly. Detune it or mount it carefully so the mouthpiece points downward.

2. Dive More

Inexperienced divers are famous for burning through their air supply at a furious rate. The reason is anxiety. A new diver is understandably nervous, and his body's automatic response to danger is to raise his metabolism, his heart rate and his breathing rate. It's hard-wired, the body revving its engine to be ready for fight or flight, though the result is a lot of air cycled through his lungs but never used, just dumped into the ocean.

You may not be a new diver, but unless you dive almost every week it's still an unnatural activity, and your body isn't as happy as you are about putting its head under water. Dive more — your body will get used to the idea, and you'll breathe less.

3. Take a Class

Any class, almost, will reduce your gas consumption just by making you feel more accomplished and therefore more comfortable. But the best bet is probably a class to improve your weighting and buoyancy control. When you get that dialed in, you can control your altitude mostly with your lungs, so you're not squirting that valuable gas into your BC and then venting it to the ocean. Most important, you can now forget (nearly) about the mechanics of diving, drift like a fish, and relax.

4. Sleep More, Party Less

Be well rested on dive day. Fatigue is stress. If you start the dive already tired, your body has to work harder to overcome the extra burden, so you breathe harder. A hangover is stress too. You may think you're sober in the morning, but in fact, alcohol and other drugs affect your physiology the next day. As SSI instructor Jim Bruning puts it, "Your body does what your mind tells it to. If you had a good night of sleep, your body and mind are going to be much more relaxed, much calmer."

5. Be Early

If you're late to the boat, running to get your gear on board, worried about the hard looks of divers who were on time, stuck with the least-convenient gear station and generally playing catch-up all day, you're giving yourself unnecessary fatigue and mental stress. You start the day breathing hard and never have a chance to calm down. On the other hand, if you're early to the boat, early to gear up and early to the dive briefing, you'll conserve your energy, feel confident and relaxed, and your breathing will remain slower.

6. Swim Slowly

The energy cost of speed is even more than you might think because it's an exponential function proportional to the square of the speed. So swimming twice as fast requires four times as much energy and air. But the reverse is true, too: Swim half as fast as you do now, and you'll use only one-fourth as much air.

7. Stay Shallow

It's physics again. Because your regulator has to deliver air at the same pressure as the water, a lungful at 33 feet (two atmospheres) takes twice as much out of your tank as does the same breath at the surface. At 99 feet (four atmospheres) it takes twice as much as at 33 feet.

There's absolutely nothing you can do about that except to avoid being deeper than you have to be. If you're making a transit over an uninteresting sand flat to get to the edge of the drop-off, do it at 15 feet instead of at 40 feet, and you'll save air.

8. Minimize the Lead

If you're overweighted, you have to put more air into your BC to float it and be neutral. The inflated BC is larger and requires more energy and oxygen to push it through the water.

9. Learn how to take off weight for scuba diving

An extra eight pounds of lead means your BC is one gallon bigger when inflated enough to make you neutral. Imagine the extra effort of having to push a gallon-sized water jug through the water.

10. Adjust Your Trim

If your body is horizontal in the water, when you swim forward, your legs and fins will pass through the "hole" in the water made by your head and shoulders. You'll disturb less water and expend less energy and air. Many divers, however, swim with their feet lower than their torso and their head higher. Adjust your trim by moving some lead from your hips to your back — to trim pockets on your BC or to your tank.

11. Seek Neutral Buoyancy

Always being exactly neutral is the key. If you're not, if you're slightly heavy or light, you're constantly using fin power (and air) to maintain a constant depth. If you're not neutral, you can't glide between fin strokes and you can't hang effortlessly. For more tips, read our secrets to neutral buoyancy while scuba diving.

12. Streamline Your Gear

All fast-swimming fish have smooth skins with few or no protuberances. That minimizes drag so they can swim with the least energy and oxygen consumption. Divers, by contrast, have rough, convoluted surfaces with all sorts of attachments from scuba tanks to whistles. Anything disturbing the flow of water past your body creates drag and wastes air.

Do your best to imitate the fish. If you don't need a light on this dive, for example, don't take it. If you do need something, try to hide it in a pocket instead of dangling it from a D-ring. Take the snorkel off your mask and strap it to your leg or tuck it under your BC or get a folding snorkel that fits into a pocket. Shorten hoses that are too long. Clip your console close to your body. Suit your gear to conditions: You don't need the bulk of a BC with 40 pounds of lift in the tropics.

13. Streamline Your Movements

Keep your arms close to your body. Straighten your legs and keep them as close together as your fins will allow. Kick with short strokes so your fins stay within the slipstream of your body. Some fins do require a wider stroke so you have to compromise between efficient propulsion and streamlining. But usually you're better off finning faster instead of wider.

14. Breathe Deeply

Any oxygen taken from your tank but not absorbed into your bloodstream is wasted. That's the case when you take short, shallow breaths. A large part of the air you take in fills your throat and bronchia, but doesn't reach your lungs before it is expelled again. You have to take another shallow breath sooner because you didn't get much benefit from the first one, and a lot of air is wasted.

Instead, try to inhale deeply, filling your lungs completely with each breath. A deeper breath brings air to more of your lungs' tiny "air sacs" (the alveoli) where gas exchange takes place. It also adds more fresh air to the volume of "dead air" that remains in your lungs, throat and mouth from the previous breath, so the mix is richer. When more alveoli are more fully inflated with fresher air, gas exchange is more efficient: More oxygen is extracted from the incoming air and more carbon dioxide is released. Although each breath uses more air, you will take fewer breaths, and the net effect will be that less air is used. Short, shallow breaths are more frequent and less efficient.

Exhale fully too, so you expel as much carbon dioxide as possible. Anything not exhaled is carbon-dioxide-heavy "dead" air. On your next inhale, that dead air — instead of fresh air—partially fills your lungs. The urge to take the next breath is triggered not by lack of oxygen but by excess of carbon dioxide, so you find yourself inhaling again sooner. On the other hand, a deep exhale extends the time before you feel the need for another breath.

15. Breathe Slowly

You consume considerable energy just by breathing, by sucking the air in and pushing it out again. To inhale, you have to suck open a demand valve in your second stage and pull gas down your throat and into your lungs. Each inch along the way and each corner the gas stream turns mean friction and turbulence. Both increase the effort you put out in just breathing and decrease the amount of gas that actually gets to your lungs. Friction and turbulence are unavoidable, but the amount goes up dramatically when you try to breathe quickly — just as a faster-moving boat creates a bigger wake. The problem gets worse as you go deeper because the gas is thicker — it's like trying to suck a milkshake instead of water through a straw.

So don't force it. Try for a long, slow inhale until your lungs are full, then a long, slow exhale until they are empty. More air will get to your lungs, it will spend more time there exchanging "good" for "bad," and you will use less energy pushing the air back and forth.

16. Upgrade Your Gear

Overhaul your regulator on schedule and consider one with lower work of breathing, especially if you often dive deep. ScubaLab tests have shown that the work of breathing demanded by some regs can be three times as much as others, even more. A "hard-breathing" reg not only demands more energy and therefore oxygen just to operate it, your difficulty breathing through it increases your anxiety level and elevates your breathing rate. So it wastes gas two ways.

17. Get in Shape

Two people climb a flight of stairs. At the top, one is huffing and puffing and the other is breathing normally. The heavy breather is getting more oxygen, but he's wasting a lot of what he inhales because he's breathing so rapidly there isn't much time for gas exchange. It's an adaptation that makes sense only on land where the air supply is unlimited.

Diving can be surprisingly strenuous because water is so much denser than air. Swimming into a current, it's not difficult to elevate your breathing to the very wasteful rate of huffing and puffing. But even much lower levels of exertion will cause your breathing rate to rise. How much it rises and how soon depend mostly on your aerobic conditioning. A diver in better condition will have less increase when the workload goes up, so he will use less air. The other part of getting in shape is to lose fat and achieve a more streamlined shape.

18. Stay Warm

Even warm water is cold when you're immersed in it, because if it's cooler than about 95 degrees, it takes heat out of your body at a surprising rate. Heat is energy that has to be replaced by metabolism, using oxygen to make it. Getting cold also creates mental stress which, often without your noticing it, increases your breathing rate. Check out our Exposure Protection Guide for advice on what thickness wetsuit to wear.

19. And Just Chill Out

The competition over who uses less air can itself be a problem when divers associate low gas consumption with diving skill, virtue and the right to take up space on the boat. It's one of those self-fulfilling prophecies: You worry about using more air than your buddy, which causes stress, which elevates your breathing, so you do, in fact, use more air.

In fact, a higher rate of air consumption can be caused by many things, some of them fixable and some not. By itself it means little or nothing and is nobody's business but yours and arguably your buddy's — who, we hope, is not out to ruin your day. So if you'd like to reduce your gas consumption, work gradually on reducing your lead, controlling your buoyancy, improving your shape and posture in the water, going slowly, breathing slowly and relaxing.