

# The black-and-white energy efficiency indicator

While reviewing the existing energy efficiency measurements, *Generations* pinpointed two vital criteria for success, communication and integration.



A previous “Brains trust” session lead to a concept idea for moving fully charged container-size batteries on board, utilizing the excellent logistics infrastructure already in place for box ships worldwide. Every third container in the top layer of the cargo could be a power pack with unfolded solar panels for topping up energy during the voyage and even extracting a wind turbine for less sunny days.

Every issue of *Generations* launches a thought experiment. A small group of creative engineers, a writer and an illustrator combine their diverse skills in a “Brains trust” to present ideas about how the future might be.

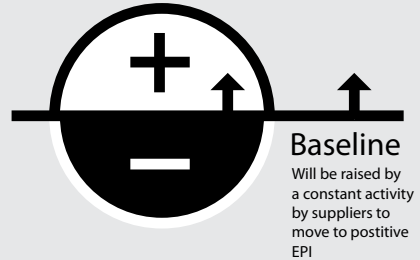
In the earlier “Brains trust” sessions, the team came up with a concept for propulsion as a service (PaaS) and a model for using container-sized batteries for powering commercial ships without fossil fuels. The latest session was about power distribution systems and it was well about time to attack the problem of energy efficiency indicators.

For this “Brains trust” session, in addition to the internal team, *Generations* invited an engineer from outside ABB. Geir Erik Samnøy, founder and managing director of a Norwegian company Present-Water, is well-known for his work on retrofit projects aimed at fuel savings and making cruise ships more energy efficient. At the time of the “Brains trust” session, Samnøy was busy working on a waste heat recovery technology for his company, and while still in a stealth mode about it, he accepted the invitation to share his insights and join Jostein Bogen, project leader for ABB’s Onboard DC Grid and Randi Østrem, propulsion control engineer of ABB, and the editorial team of *Generations*.

What if there was an energy efficiency indicator that would work on all levels, from the smallest piece of equipment to an entire fleet?

# EPI

Is either positive or negative



Introduction of measurement systems on board the next generation of ships is one of the hottest topics discussed in the maritime industry today. Innovations are taking place all the way from sensors to computerized analysis and advisory systems for captains and fleet management offices.

$$\text{EPI} = \frac{\text{Useful work}}{\text{"Dirty" energy used}} - \text{Baseline EPI for the category} = +/- 0$$

During the session, the "Brains trust" did not pursue the goal of finding a viable solution, but wanted to come up with something that would be thought provoking enough to spark off new ideas for solving a common dilemma. Here is what the team has ended up with.

## Two performance criteria

While reviewing the existing energy efficiency measurements, the "Brains trust" team pinpointed two vital criteria for success, communication and integration. The team was unanimous that there was a need for motivating the equipment suppliers at all levels to create win-win situations through better integration between systems on board. What was also needed was an attractive name for the initiative; one that would point to opportunities rather than focus on existing problems. "Performance" became the key word.

## Energy Performance Indicator (EPI)

The discussion quickly homed in on reducing the usage of "dirty energy," leaving renewable energy, such as solar or wind, out of the equation. In addition to that, the team concluded to sort out waste heat as clean energy. What the team wanted to establish was the quotient of utilization (eg, transport work) and "dirty energy" consumption.

For turning it into an indicator, the "Brains trust" team decided that each category of equipment would need a baseline value to be deducted. This would place the EPI as a number above or below zero. This way, the binary black or white indicator would simply identify a piece of equipment as above or below the baseline for a specific category. The definition of and units for "useful work" and "dirty energy" could vary from category to category and still make the EPI a tool for comparison, whether the calculation is made for a particular circuit board, a pump or an entire oil tanker.

## Two routes to a positive EPI

The "Brains trust" thought that dividing each category of equipment in just two groups would create the pressure needed to move the industry towards a more energy efficient approach. And this is why: no one likes to stay below average, and when everyone focus on the achievable goal of just being on the good side of the baseline, the industry average for every category would keep moving in the right direction. And that is exactly what is needed.

# Who has the best “fruit basket”?

A Q&A with our “Brains trust” guest  
Geir Erik Samnøy



**Q: Do we have good incentives for energy efficiency regulation today?**

A: The real incentive is financial, whatever scheme you get into. There are a lot of theoretical ideas for schemes out there, but we still need to see what will work in practice and become legislated.

**Q: Is the EEDI the strongest initiative?**

A: Right now it is, but it is still a design index. If you have a ship that does well on the EEDI, you still have to look at how it will be operated. Is slow-steaming an option, for example? In other words, what is the optimal way to transport goods from A to B?

It is the same in the power industry. We might be the best in the world at producing, say, green power, but we are the worst in the world when it comes to

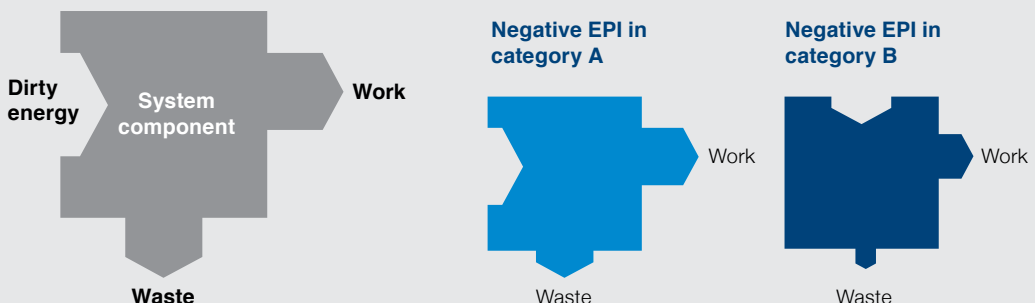
consumption and conservation. These two sides of the coin go together. It is a similar situation with water. We can reduce the cost of water tremendously, but if one operator uses 400 liters of water per person per day and another uses 150 liters, where do you put your emphasis? Is it on cost-efficient production, or do you take the holistic view?

**Q: What is your response to the statement “Every system is a subsystem”?**

A: It is. Classification societies are changing the way they write the rules. Now they are more into functional rather than prescriptive rules. If you look at systems and subsystems, the subsystem has a function but what about the overall function? Being able to see the whole picture is very important. So you can ask what sort of subsystems or combinations of these will be best for the job.

## Comparing “fruit baskets,” rather than apples and pears

Through exchange of waste energy, components and subsystems with negative EPI may be integrated into EPI-positive systems in another category.



**Q: The two ideas the “Brains trust” team had for an energy performance indicator were about communication and cooperation. The indicator should incentivize suppliers to cooperate by thinking of their system as a subsystem and looking for synergies. Do you have any examples of this becoming the key in communication between different vendors?**

A: Some of the bigger companies see this as an opportunity to be a total integrator, meaning they are acquiring a lot of smaller companies with special skills and technology so that they can provide, within one company, an entire solution.

**Q: A traditional weakness of the shipping industry is that there is such a fragmented market of suppliers.**

A: Exactly, but now some of them have their own ship design, ballast water systems, scrubbers. They are looking into energy-efficient technologies and all the big challenges. They are trying to create what is best for their business and keep it internal. That is good because they are capable of doing everything themselves. But they will still be challenged on each subsystem. If you have a system that captures everything but you are still the number four technology within each subsystem, you do not necessarily become the provider of the total solution. The operators have also learned over the years that being in bed with one vendor is not good because it is essentially a monopoly.

**Q: So an energy performance index could provide a benchmarking system that makes it possible to combine apples with pears?**

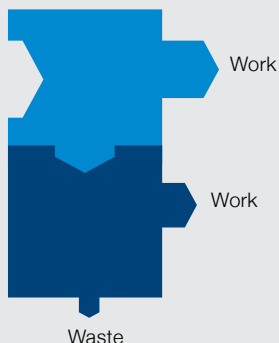
A: Precisely. It is a question of who has the best “fruit basket”.

**Q: Do you mean moving from one “fruit basket” to another and in that way incentivizing sub-suppliers to upgrade their EPI so that they can find a synergy?**

A: Yes. As an example of this type of synergy, one provider might have the best solution in their segment for solving one problem but, say, it realises it has a waste problem. Then it looks for a partner that can use this waste to drive its own process. That is the sustainable way for moving forward!

Text: Johs Ensby

**Positive EPI in category C**



**Category D**

