COCIR

Sustainable Competence
in Advancing Healthcare

COCIR SELF COMMITMENT IN ECODESIGN OF MEDICAL IMAGING EQUIPMENT

GOING GREEN 2014: CARE INNOVATION
Vienna, 19 November 2014

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THE STORY SO FAR

- The Ecodesign Directive 2009/125/EC introduces ecodesign requirements for selected product groups. Medical devices were included in the list of eligible products.
- In 2008 COCIR presented to the European Commission a project for self-regulation under the Ecodesign Directive.
- In November 2009 COCIR submitted to the Consultation Forum (CF) a first proposal. The proposal defined a methodology (called SRIv1) and a pilot case on ultrasound imaging equipment.
- In 2011 COCIR presented a revised version, the SRIv2 responding to received comments and introducing new elements. The SRIv2 was applied to Magnetic Resonance (MRI) equipment.
- The SRIv3, built on the experience gathered with the MRI project has been published in June 2013.

THE COCIR SRI

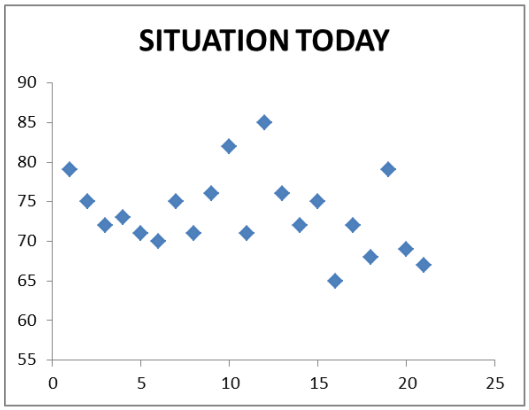
- The COCIR SRI is a commitment of COCIR Members with the European Commission (open to non-member companies as well) to reduce collectively the environmental impact of medical imaging devices placed on the European market.
- The COCIR SRI, its methodologies and achievements are shared and openly discussed with the EC, EU Member States, NGOs and interested parties.
- As the market of medical devices is global, the COCIR SRI brings benefits all over the world.
- It is based on:
  - The SRI Methodology
  - The Annual Reporting of achievements

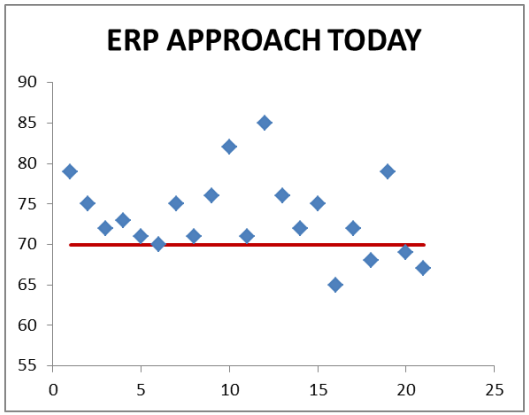
THE SRI APPROACH

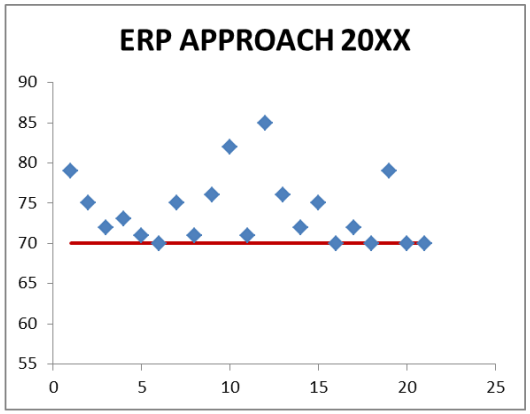
THE FLEET APPROACH

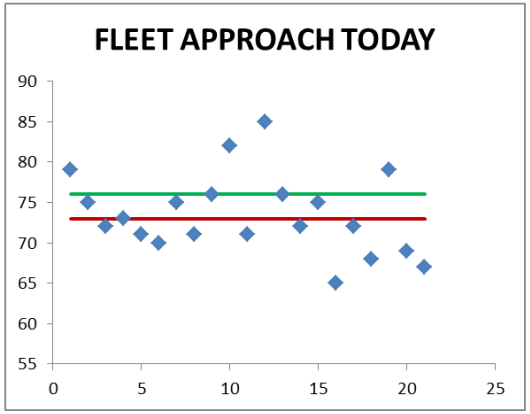
- The SRI for Medical Imaging Equipment is based on the so called "fleet approach" that significantly differs from the "traditional" approach used so far by Implementing Measures under the Ecodesign Directive.
- The fleet approach has been deeply discussed and explored during the preparation of the draft proposal of the ErP Directive, approved in 2005.
- Targets are set at the level of the whole Medical Industry (participating in the Initiative) and calculated as the average performance (weighted against sales) of the products placed on the market by participating companies.
- The methodology provides also for specific company targets that need to be reached by each company to ensure that the industry target is achieved.

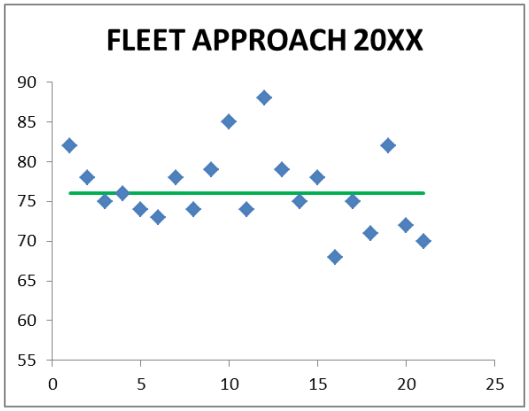
THE FLEET APPROACH











WHY THE FLEET APPROACH

- For most of the modalities, COCIR covers up to 90-98% of the market, therefore the SRI covers quite all products placed on the market and companies.
- The fleet approach provides more flexibility that is of paramount importance for the medical sector.
- Companies are given different tools to achieve targets, and are free to adopt technological solutions not restricting their ability to innovate and develop new technologies
- Increasing the average performance of the market could be achieved also acting on the market mix.
- The methodology allows to obtain results even before the end of the innovation cycle, that could be longer than 3-5 years. A classical approach targeting product specific performances would not have obtained results before the placing on the market of new product generations, at the end of the innovation cycle.

WHAT'S NEW

THE SRIV2 METHODOLOGY

WHAT IS THE SRI METHODOLOGY?

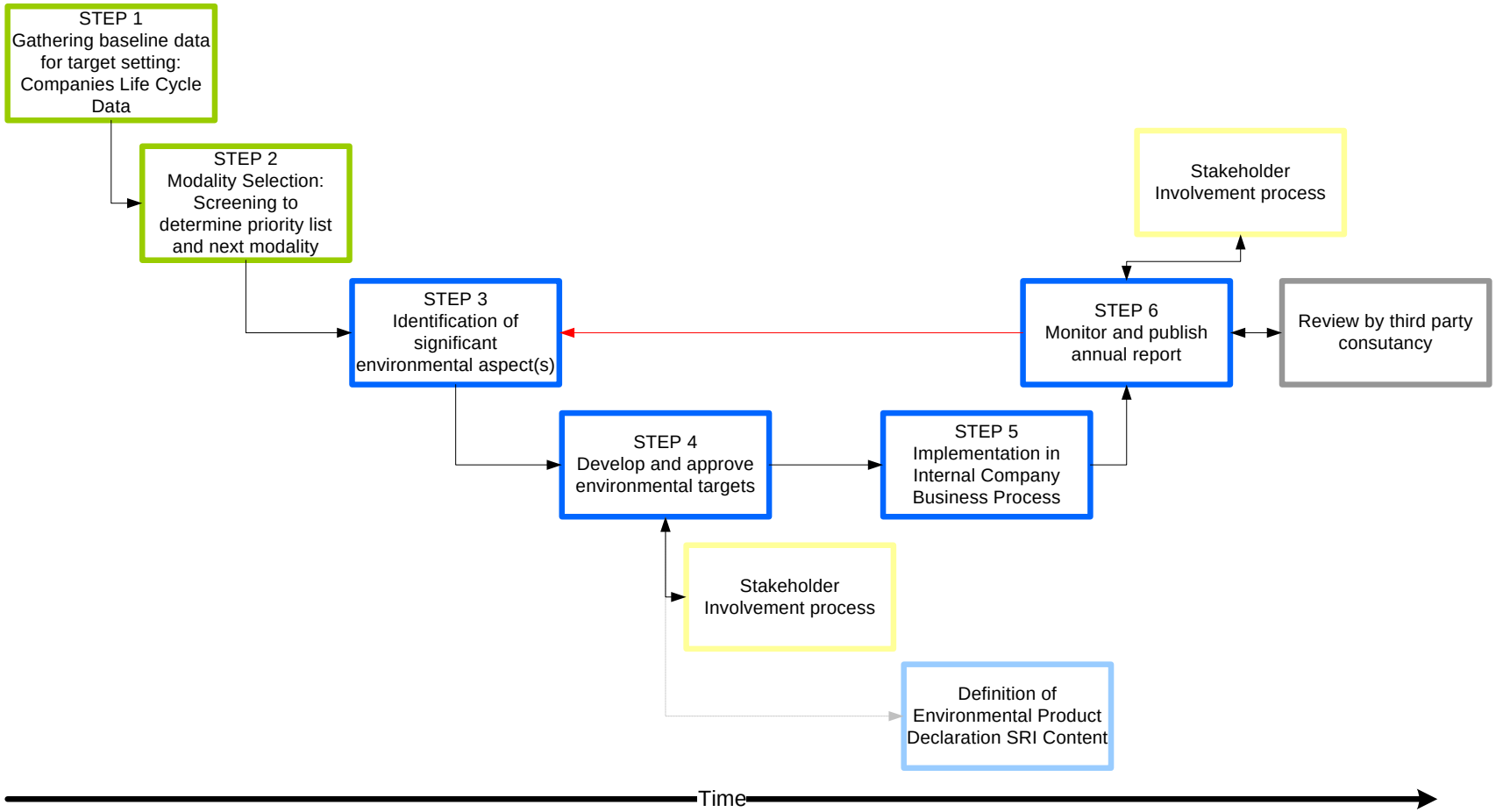
- **WHAT IT IS NOT:**
  - It is **NOT** a tool for ecodesign

- **WHAT IT IS**
  - It is a tool to assess medical imaging modalities, their impacts to environment and potential for improvement
  - It is a tool to define a common industry ecodesign target in a quantitative and fact based way
  - It defines the data to be provided by companies and rules to allow assessment of achievements

The ecodesign of products is completely managed by companies which are left with the flexibility to apply design solutions to achieve the given industry target.

Company targets are developed with the purpose of giving companies a tool to assess their progresses.

THE SIX STEP METHODOLOGY



Overview SRI 6 STEPS Methodology (the **green** boxes signify task that need to be done once . The **blue** boxes cover the four steps that represent a closed loop: to be repeated for continuous improvement and transparency)

STEP 4: DEFINE THE TARGET

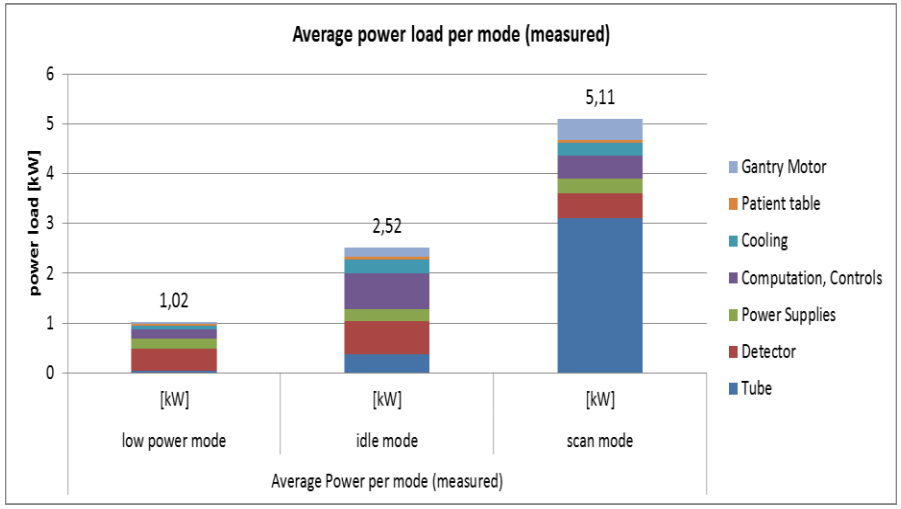
- Developing an ecodesign target once an environmental aspect is selected is the most complex task of the methodology.
- Selected aspects need to be quantified and measured
- What is required:
  - Common definitions, system boundaries, functional units, categorizations, use scenarios per the specific modality
  - A measurement method in case standards are not available (e.g. to measure the energy consumption)
  - An estimation of the improvement potential from an engineering perspective
  - Collection of baseline data for **ALL** the models placed on the market
  - Estimation of different scenarios (BAU, BNYA, BBAU, etc)

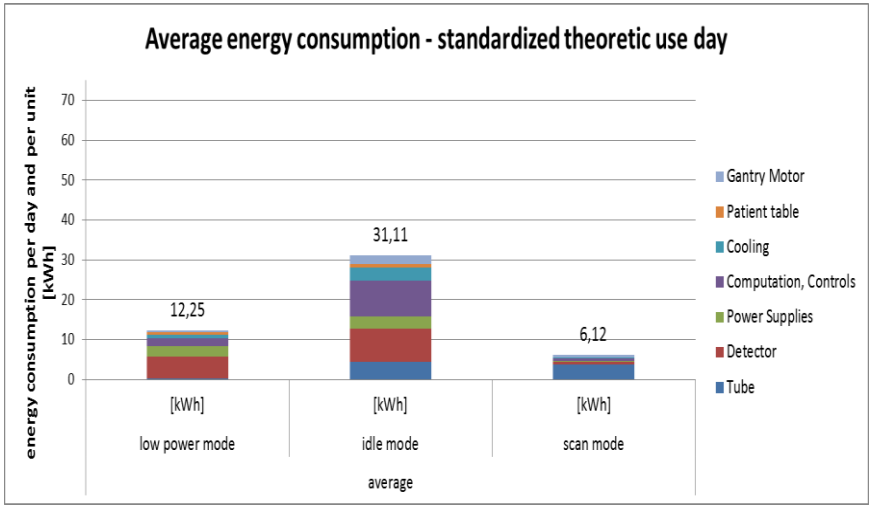
MEASUREMENT METHODOLOGY

- No measurement standards exists for the measurement of the energy consumption of imaging medical devices
- The SRI SC realized that the development of a measurement methodology which allows solid and comparable results is the key to further develop any energy related initiative.
- The definition of a methodology requires around 1 year and a lot of field data. Therefore measurements are performed according to drafts to finalize the methodology (iterative process). This increases the complexity by far.
- The SRI measurement methodology is even more complex than a "normal" one as it should also be refined to ensure it is able to take into account all the possible improvement options (e.g. new modes which could be implemented in the future).

IMPROVEMENT POTENTIAL

- A methodology has been defined in 2012 by the SRI Steering Committee to identify and quantify the maximum improvement potential for the reduction of the energy consumption of the selected modality.
- With the use of templates and direct interviews, data is collected from Companies for their product portfolio. The energy consumption is allocated to the different modules of the modality.





IMPROVEMENT POTENTIAL

Experts provide an estimation of the maximum improvement that can be achieved for each module taking into account technologies that are not yet available (under research or expected to be available at the end of the innovation cycle).

COMPANY NAME			
CT: ALLOCATION OF THE ENERGY CONSUMPTION PER MODULE PER MODE			
Applicable to the following CT models:	Model1, Model2, ect		
Allocations of energy use (%)	Off	Idle	Scan
Tube and generator chain			
Detector			
Power distribution unit and other power supplies			
Computation, Controls			
Cooling			
Patient table			
Gantry Motor			
	0,00%	0,00%	0,00%

CT: ALLOCATION OF THE ENERGY CONSUMPTION PER MODULE PER MODE			
Applicable to the following CT models:	Model1, Model2, ect		
Possible reduction(%)	Off	Idle	Scan
Tube and generator chain			
Detector			
Power distribution unit and other power supplies			
Computation, Controls			
Cooling			
Patient table			
Gantry Motor			

The application of the maximum improvement potential to the company Business as Usual (BAU) provides the company specific Best not yet Available (BnyAT) scenario (the maximum improvement could be applied to the baseline only in case a steady decrease of the environmental aspect is expected. This provides for a more ambitious target).

TARGET SETTING

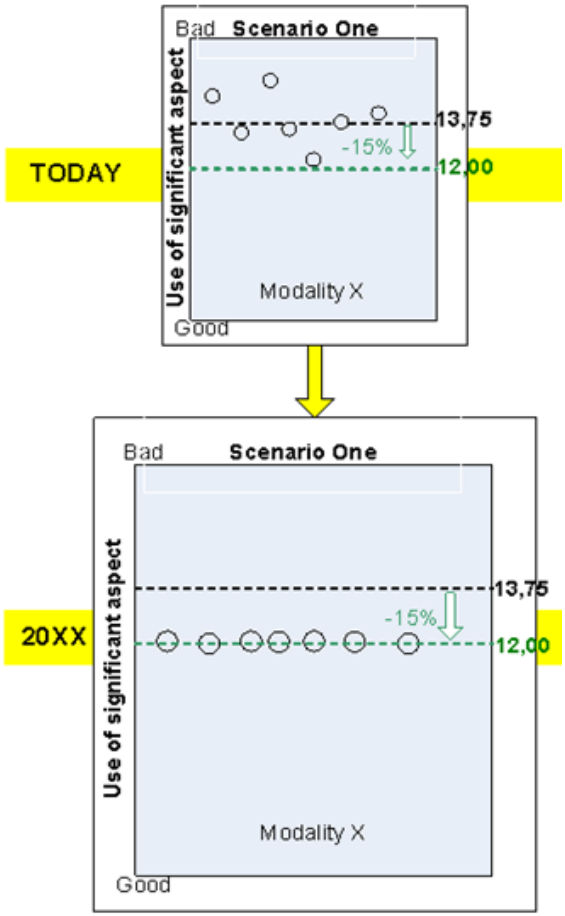
To determine the target, 3 different scenarios are defined according to different assumptions based on expert judgement.

- **Business as usual scenario (BAU):** the basic assumption is that given the situation today, during the innovation cycle all the competitors will invest in research to match the best performing players on the market. This assumption is very strong, especially in a sector where environmental performances are not the main driver for purchase choices of hospitals, public authorities or healthcare institutions. Nonetheless such assumption will ensure that ambitious targets will be set.
- **Best not yet available technology scenario (BnyAT):** each company provides a reasoned reduction value, based on the "best not yet available technology" (technology not yet available but still in the research and development phase) that could be achieved during the innovation cycle. The scenario is based on the assumption that all the companies could reach a reduction equal to the provided reduction values.
- **Beyond as usual scenario (Beyond BAU):** This scenario is based on the assumption that in the innovation cycle all the players will improve their products according to the average reduction of the BnyAT, except the best performing company that will improve the performance according to its own prediction, as improvements for the top runner are more difficult to obtain. The average value obtained from this scenario is chosen as the target for the next innovation cycle.

BAU SCENARIO CALCULATION

- **Business as usual (BAU) scenario in 20xx:** This scenario represents the market fleet average in year 20xx under the assumption that no SRI is in place.
- **BAU calculation: SRIv2 -** This methodology works fine for modalities for which a steady decrease in the environmental aspect (e.g. energy consumption) is expected as it sets an ambitious starting point for the definition of the target.

  The scenario market fleet average is calculated assuming that in 20xx all companies will match the performance of the front runner today. Therefore companies' scenarios are equal to the performance of the front runner and so the fleet average.



BAU SCENARIO CALCULATION

BAU calculation: SRIV3

- This methodology is more flexible, accurate and provides a better estimation of the scenario. It works fine for all modalities also in case the environmental aspect is expected to increase.
- Each Company is required to provide an estimation of its own fleet average in 20xx according to expected market positioning, research patterns and long term strategies. The weighted average against sales forecast in 20xx provides a good estimation of the market BAU scenario.

TARGET SETTING SRIv2

3. Gather Company Expert judgment on feasible improvement (expert judgement - Best NOT yet available technology (20xx)) for later verification of final target (related to functional unit and use scenario)*

Forecast individual feasible improvement per Company (Expert judgment)	-10%	-19%	-20%	-21%
Average feasible improvement for SRI companies (expert judgment - Best NOT yet available technology (20xx))	-17,50%			

* Expert judgment of individual companies for aspect that has been selected in the previous step

Note: The top-performer can identify itself as the leader by recognizing its aspect value to be equal to the average absolute value of the Scenario One BAU. This company will be allowed to set itself its declared expert judgment improvement potential percentage, if this it lower than the BAU percentage. This principle will be automatically included from COCIR in the calculation of the overall proposed target.

Scenario	Company A	Company B	Company C	Company D	(absolute) average of aspect (all SRI companies)*	Range for setting targets	Description
Energy use kWh of individual companies - today - (Incl. Frontrunner considered as BAT)	12,0	15,0	13,0	15,0	13,75	baseline today	-
Scenario One Energy use (kWh) BAU - 20xx -	12,0	12,0	12,0	12,0	12,00	-12,7%	All SRI companies will aim to achieve **in average** what the front runner has achieved today (goal to mutually achieve -14.6%)
Scenario Two Energy use (kWh) Best NOT yet available technology -20xx-	9,9	12,375	10,725	12,375	11,34	-17,5%	**Each** individual SRI company will strive to achieve what has been predicted on average by the experts **(-17,50%)**
Scenario Three Energy use (kWh) BEYOND BAU - 20xx	10,8	12,38	10,73	12,38	11,57	-15,9%	**Each** individual company will strive to achieve what is possible on avg. today **(-17,50%, except Front Runner -10%)**, adding up to a total improvement -15,9%

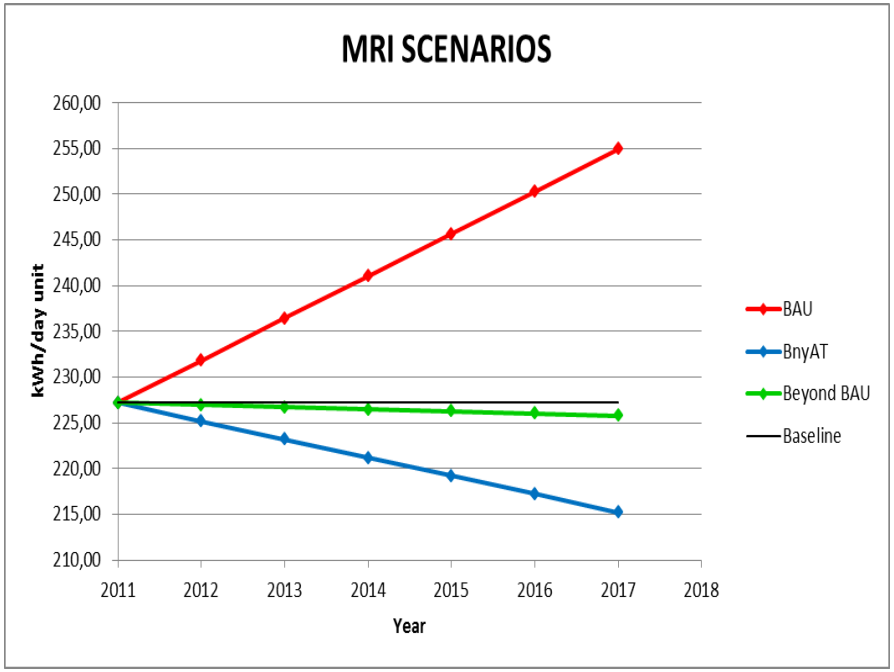
* Absolute average values are reported. They are relevant for the individual company target setting. Especially the average absolute value of Scenario One BAU is important for the individual company to identify itself as the possible top-performer if its aspect value to be equal to the average absolute value.

Note: An additional incentive for the designer can be abstracted from the table since the company can see the average value of absolute performance and thus determine its actual standing. So there will be no extra need to report confidential information to individual members.

TARGET SETTING SRIv2

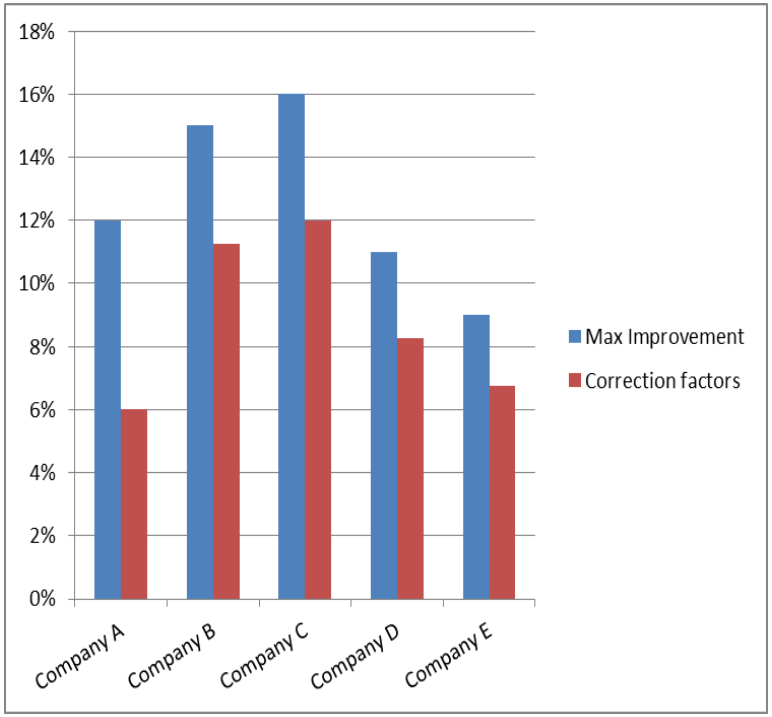
This methodology was developed in 2009/2010 and presented in the SRI v2. The scenario is calculated as the weighted average of companies' scenarios which are determined as follows:

- **All companies other than the front runner:** Each company is assigned a value equal to the respective baseline value multiplied for the average of the reduction potentials declared by all companies
- **Front runner:** the front runner is assigned a value equal to its baseline value multiplied for the reduction value he declared as it is reasonable to expect that for the front runner further improvements are more difficult to achieve.



TARGET SETTING SRIV3

- Each Company scenario is calculated as follows:
- **All companies other than the front runner:** The Company Beyond BAU scenario is calculated applying the maximum improvement potential to the BAU scenario scaled by a correction factor of 0,75.
- **Front runner:** The Company Beyond BAU scenario is calculated applying the maximum improvement potential to the BAU scenario scaled by a correction factor of 0,5.
- The Beyond BAU scenario fleet average is calculated as the weighted average against sales of the Companies' scenarios.



STAKEHOLDER INVOLVEMENT

- The targets developed according to STEP 4 are submitted to the EC for discussion, before being officially adopted by participating companies.
- **Reporting** is yearly submitted to the EC to show and document the achievements and to collect comments, suggestions and opinions
- The Consultation Forum members are invited to attend annual Steering Committee meetings.
- All relevant documents are published on the COCIR website

Annual SRI Status Report 2010/2013

ONE MODALITY PER YEAR

- The SRI for Medical Imaging Equipment applies to the following modalities:
  - Magnetic Resonance
  - Computer Tomography
  - X-ray
  - Nuclear Medicine
  - Ultrasound
- Listed modalities are completely different technologies, used for different applications.
- They cannot be considered as a single product group but have to be considered as separate and independent product groups.
- For this reason Participating Companies commits to apply the methodology to one new modality per year.

	2011	2012	2013	2014	2015
MRI	✓				
CT		✓			
X-Ray			✓		
Nuclear Medicine				✓	
Ultrasound					✓

COCIR SELF-REGULATORY INITIATIVE
FOR MEDICAL IMAGING EQUIPMENT

ULTRASOUND PILOT PROJECT

ULTRASOUND PILOT PROJECT

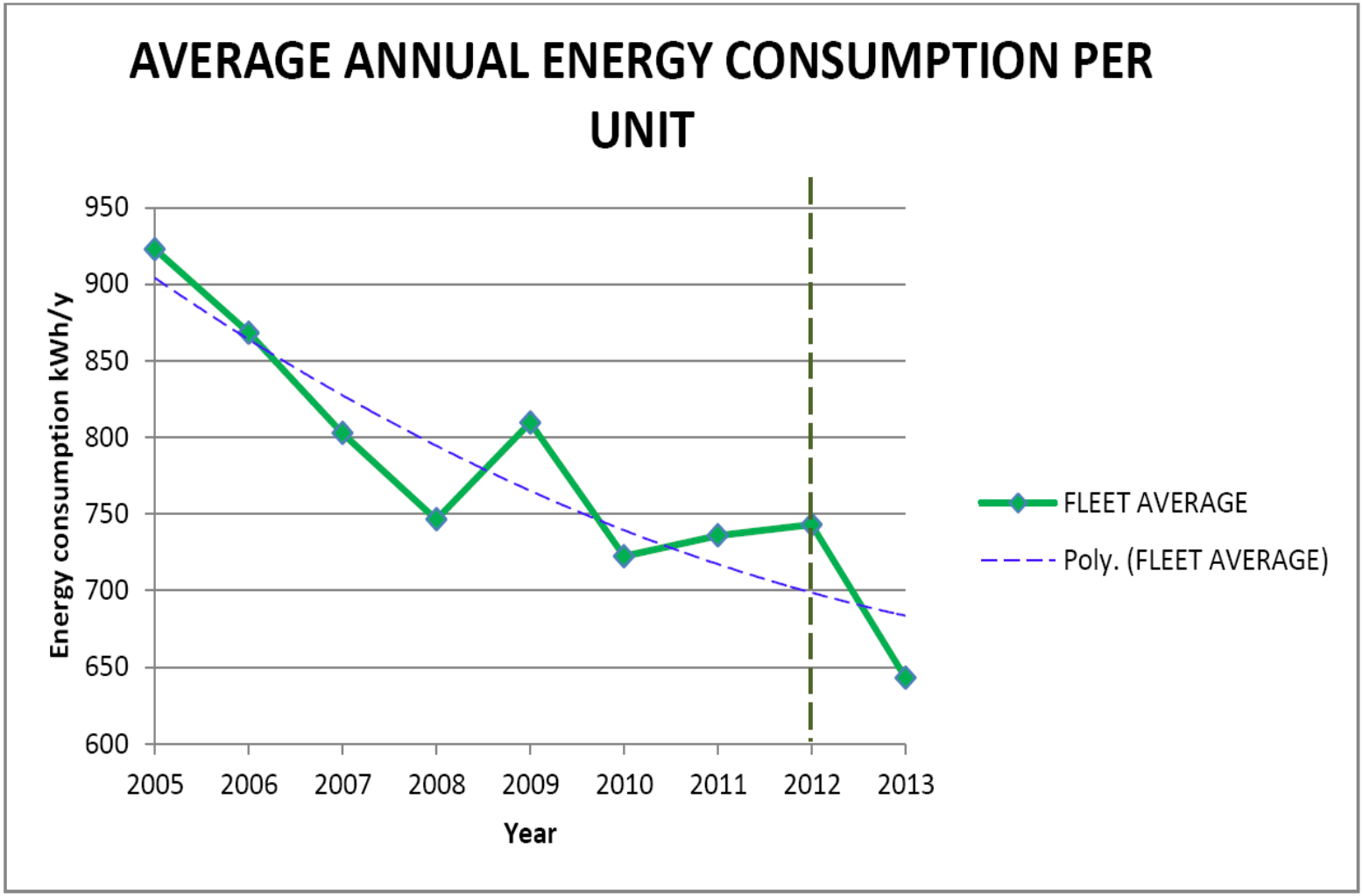
- The Ultrasound pilot project was launched in 2009 as a pilot to gather experience for developing the SRI methodology.
- Ultrasound equipment was chosen because of the relative simplicity and the already well established ecodesign practices. The lessons learnt from the US pilot helped to develop the SRIv2.
- The Steering Committee decided not to apply the new methodology SRIv2 to Ultrasound, not to loose the achievements obtained in 2010, but to start in 2010 with MRI.
- The ultrasound pilot project committed participating companies to achieve by 2012 a reduction of 25% in energy consumption of sold products compared to 2005 baseline (14,5% compared with 2009 level).
- The new methodology v3 will be applied to ultrasound starting from 2015/2016.

ULTRASOUND PILOT PROJECT

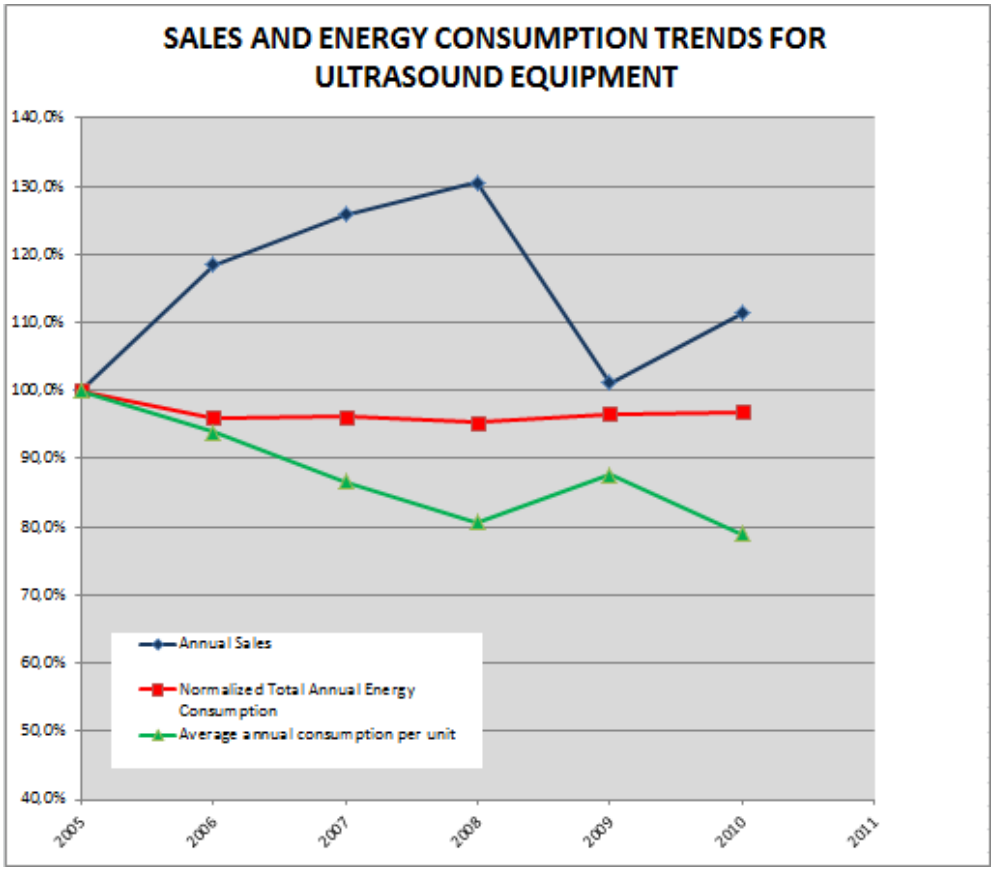
Table 2: *Achievements in the ultrasound Pilot Project*

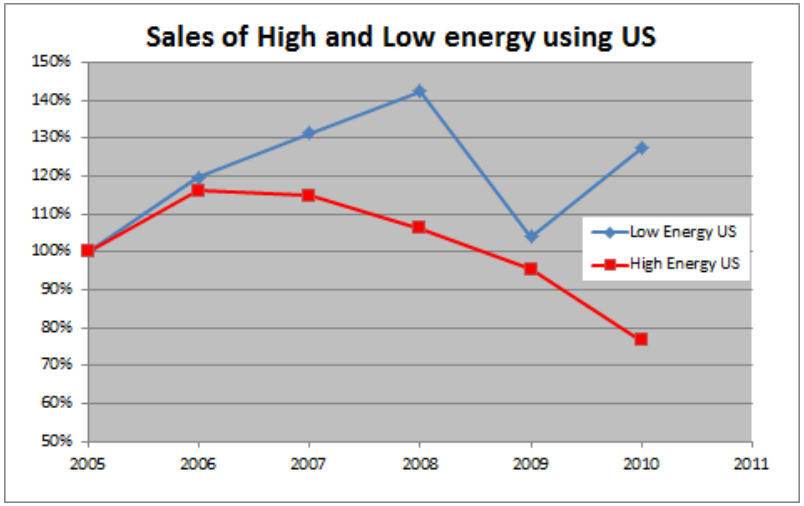
Year	Total annual sales	Total annual sales as a % of 2005 annual sales	Total annual energy consumption of all new products sold	Total annual energy consumption of all new products as a % of 2005 annual energy consumption	Actual average annual energy consumption of all new products sold in kWh (per unit and year)	Actual average annual energy consumption of all new products compared to 2005	Targeted average annual energy consumption of all new products sold	Targeted annual energy consumption of all new products compared to 2005
	Units[5]		kWh[6]		kWh/unit year		kWh/unit year	
2005	✓17099	100%	✓15.757.081	100,00%	✓923	100%	-	
2006	✓20260	118%	✓17.536.665	111,29%	✓868	94%	-	
2007	✓21526	126%	✓17.193.454	109,12%	✓803	87%	-	
2008	✓22316	130%	✓16.606.971	105,39%	✓746	81%	-	
2009	✓17273	101%	✓13.975.406	88,69%	✓809	88%		
----------Entry into force of SRI for ultrasound equipment----------								
2010	✓19030	111%	✓13.589.213	87,96%	✓**722**	**78%**	769	**83,5%**
2011	✓21672	127%	✓15.969.315	101,35%	✓**736**	**80%**	730	**79,2%**
2012	✓20411	119%	✓15.166.758	96,2%	✓**743**	**80%**	**691**	**75,0%**
2013	19620	115%	12.618.615	80,0%	**643**	**67%**		

ULTRASOUND ACHIEVEMENT



ULTRASOUND PILOT PROJECT





COCIR SELF-REGULATORY INITIATIVE
FOR MEDICAL IMAGING EQUIPMENT

MAGNETIC RESONANCE IMAGING

MEASUREMENT OF ENERGY CONSUMPTION

- The development of a measurement methodology took around 1 year and lot of work from many company experts.
- To define a procedure to measure the energy consumption of MRIt which allows comparability and repeatability of results the following elements needed to be defined:
  - Systems boundaries
  - Definitions (i.e. operating modes)
  - Product categories
  - Use scenario (typical examination)
  - Ranges for parameters and configurations
  - Procedure workflow

MEASUREMENT OF ENERGY CONSUMPTION

Use scenario

Mode	Description	Typical time in mode per day (hours)	Estimate of % Energy over Life
Off mode	Lowest power state; requires interaction to make system ready; system circuit breakers on.	12	45
Standby mode	System on, ready to scan, gradient system quiescent.	7 (varies)*	30
Scanning mode	System is activating gradient system and capturing image data.	5 (varies)*	25

Diagnostic Application	IMV © Market Distribution	Normalized Distribution
Spine	26%	33%
Brain	25%	31%
Lower and Upper extremities	20%	25%
Vascular	9%	11%

MEASUREMENT OF ENERGY CONSUMPTION

Ranges for key parameters that could influence the results have been defined to allow full comparability.

HEAD	Slices	FoV / mm x mm			Slice thickness / mm			Resolution / mm			Bandwidth / Hz/Px		Sequence duration	Leitlinien BAEK 2000.pdf	
	S/P	BÄK	Max	Min	BÄK	Max	Min	BÄK	Max	Min	Max	Min	BÄK	Table	Subtopic
localizer	1		280x280	240		8	6		1,1	0,6	83,3	290			
t2_tirm_tra_dark-fluid_320	28	≤ 250	230 x 200	220x220	≤ 6	5	5	≤ 1	0,8	0,7	31,3	191	< 00:05:00	Tabelle 2	Schädel
t2_tse_sag_512	27	200..250	250 x 225	220x220	5..6	5	5	≤ 1	0,5	0,5	195	31,3	< 00:05:00	Tabelle 1a	
ep2d_diff_3scan_trace_p2	23	≤ 250	240	210		5	5	≤ 1	1,9	1,2	1305	250,0	< 00:05:00	Tabelle 2	MRA
t1_se_tra_320	28	200..250	230 x 230	220x220	5..6	5	5	≤ 1	0,9	0,4	163	25	< 00:05:00	Tabelle 1a	
t1_se_tra_320	28	200..250	230 x 230	220x220	5..6	5	5	≤ 1	0,9	0,4	163	25	< 00:05:00	Tabelle 1a	
t1_se_cor_320	32	200..250	230 x 230	220x220	5..6	5	5	≤ 1	0,9	0,4	163	25	< 00:05:00	Tabelle 1a	

SPINE	Slices	FoV / mm x mm			Slice thickness / mm			Resolution / mm			Bandwidth / Hz/Px		Sequence duration	Leitlinien BAEK 2000.pdf	
	S/P	BÄK	Max	Min	BÄK	Max	Min	BÄK	Max	Min	Max	Min	BÄK	Table	Subtopic
localizer	5		450x450	240		8	8		1,8	0,6	290	83,3			
t2_tse_sag_512	16	≤ 350	300x300	260	≤ 4	4	3	≤ 1	0,8	0,5	244	41,67	< 00:05:00	Tabelle 2	BWS/LWS
t1_tse_sag_512	15	≤ 350	300x300	260	≤ 4	4	3	≤ 1	0,8	0,5	250	62,5	< 00:05:00	Tabelle 2	BWS/LWS
t2_tse_tra_512	20	≤ 350	230 x 230	150x150	≤ 4	4	4	≤ 1	0,7	0,4	195	250	< 00:05:00	Tabelle 2	BWS/LWS
t1_tse_tra_448	20	≤ 350	230 x 230	150x150	≤ 4	5	4	≤ 1	0,7	0,4	228	25	< 00:05:00	Tabelle 2	BWS/LWS

ABDOMEN	Slices	FoV / mm x mm			Slice thickness / mm			Resolution / mm			Bandwidth / Hz/Px		Sequence duration	Leitlinien BAEK 2000.pdf	
	S/P	BÄK	Max	Min	BÄK	Max	Min	BÄK	Max	Min	Max	Min	BÄK	Table	Subtopic
localizer	5		500x500	380		8	6,0	1,7	2,0	0,989583	450	83,3			
t1_fl2d_opp-in_tra_p2_mbh	30	300..400	380	330x350	≤ 6	8	6	≤ 2	1,5	1,1875	977	83,3	< 00:00:45	Tabelle 1b	
t2_trufi_cor_p2_bh	25	300..400	420	350x300	≤ 6	10	5	≤ 2	1,4	1,0	651	125	< 00:05:00	Tabelle 1b	
t2_tse_tra_p2_mbh_320	30	300..400	380	330x350	≤ 6	8	5	≤ 2	1,2	1,1	651	62,5	< 00:05:00	Tabelle 1b	
t1_vibe_fs_tra_p2_320_bh_pre	64	300..400	400	330x350	≤ 6	4	3	≤ 2	1,25	1,1	488	166,7	< 00:00:45	Tabelle 1b	
t1_vibe_fs_tra_p2_320_bh_arterial	64	300..400	400	330x350	≤ 6	4	3	≤ 2	1,25	1,1	488	166,7	< 00:00:45	Tabelle 1b	
t1_vibe_fs_tra_p2_320_bh_venous	64	300..400	400	330x350	≤ 6	4	3	≤ 2	1,25	1,1	488	166,7	< 00:00:45	Tabelle 1b	
t1_vibe_fs_tra_p2_320_bh_delayed	64	300..400	400	330x350	≤ 6	4	3	≤ 2	1,25	1,1	488	166,7	< 00:00:45	Tabelle 1b	
t1_vibe_fs_cor_p2_bh_288_post	128	300..400	400 x 345	350x315	≤ 6	4	1,6	≤ 2	1,4	1,1	600	166,7	< 00:00:45	Tabelle 1b	

KNEE	Slices	FoV / mm x mm			Slice thickness / mm			Resolution / mm			Bandwidth / Hz/Px		Sequence duration	Leitlinien BAEK 2000.pdf	
	S/P	BÄK	Max	Min	BÄK	Max	Min	BÄK	Max	Min	Max	Min	BÄK	Table	Subtopic
localizer_tra	3		500x500	280		8	5		2,0	0,7	250	83,3			
localizer_sag+cor+tra	3		350	215x231		8	5		1,4	0,7	250	83,3			
t1_se_sag_512	32	≤ 250	160 x 160	160x160	3,0	4	3	≤ 0,5	0,5	0,3	244	31,25	< 00:07:00	Tabelle 2	Kniegelenk
t2_tse_fs_sag_320	30	≤ 250	160 x 160	160x160	3,0	4	3	≤ 0,5	0,5	0,5	244	41,67	< 00:07:00	Tabelle 2	Kniegelenk
pd_tse_fs_cor_p2_512	30	≤ 250	160 x 160	140	3,0	4	3	≤ 0,5	0,5	0,3	195	41,67	< 00:07:00	Tabelle 2	Kniegelenk

ANGIO	Slices	FoV / mm x mm			Slice thickness / mm			Resolution / mm			Bandwidth / Hz/Px		Sequence duration	Leitlinien BAEK 2000.pdf	
	S/P	BÄK	Max	Min	BÄK	Max	Min	BÄK	Max	Min	Max	Min	BÄK	Table	Subtopic
I_Localizer_feet	7		500x500	400 x 400		8,0	7		2,0	1,6	558	244			
II_Localizer_legs	7		500x500	400 x 400		8,0	7		2,0	1,6	558	244			
III_Localizer_upper_legs	7		500x500	400 x 400		8,0	7		2,0	1,6	558	244			
IV_Localizer_abdomen	7		500x500	400 x 400		8,0	7		2,0	1,6	558	244			
IV_Angio3D_abdomen_pre	96	≤ 400	400 x 350	330x350		2,6	1,3	≤ 2	1,4	1,1	680	488	< 00:05:00	Tabelle 2	V. cava
III_Angio3D_upper_legs_pre	96	≤ 500	400 x 350	330x350		2,6	1,3	≤ 2	1,4	1,1	680	488	< 00:05:00	Tabelle 2	Extremitätengefäße
II_Angio3D_legs_pre	88	≤ 500	400 x 350	330x350		2,2	1,1	≤ 2	1,3	1,0	690	488	< 00:05:00	Tabelle 2	Extremitätengefäße
I_Angio3D_feet_pre	96	≤ 500	400 x 350	330x350		2	0,9	≤ 2	1,3	0,9	490	488	< 00:05:00	Tabelle 2	Extremitätengefäße
IV_Care_bolus	1		450 x 365	330x350		20,0			1,8		400				
IV_Angio3D_abdomen	96	≤ 400	400 x 350	330x350		2,6	1,3	≤ 2	1,4	1,1	680	488	< 00:01:00	Tabelle 2	V. cava
III_Angio3D_upper_legs	96	≤ 500	400 x 350	330x350		2,6	1,3	≤ 2	1,4	1,1	680	488	< 00:01:00	Tabelle 2	Extremitätengefäße
II_Angio3D_legs	88	≤ 500	400 x 350	330x350		2,6	1,1	≤ 2	1,3	1,0	690	488	< 00:01:00	Tabelle 2	Extremitätengefäße
I_Angio3D_feet	96	≤ 500	400 x 350	330x350		2	0,9	≤ 2	1,3	0,9	490	488	< 00:01:00	Tabelle 2	Extremitätengefäße

MEASUREMENT OF ENERGY CONSUMPTION

Energy measurement test procedure

Test measurements typical head measurement

Starttime	Action	Endtime	Sequence duration	Power / kW	Time / h	Energy / kWh/sequence
9:00:00	Recorded start time					
	stand-by: patient preparation and positioning; patient data entry					
	localizer		00:00:10	60,00	0,0028	0,17
	stand-by: start new sequence					
	t2_tirm_tra_dark-fluid_320		00:04:32	60,00	0,0756	4,53
	stand-by: start new sequence					
	t2_tse_sag_512		00:03:45	60,00	0,0625	3,75
	stand-by: start new sequence					
	ep2d_diff_3scan_trace_p2		00:01:39	60,00	0,0275	1,65
	stand-by: start new sequence					
	t1_se_tra_320		00:02:53	60,00	0,0481	2,88
	stand-by: contrast agent injection / start new sequence					
	t1_se_tra_320		00:02:53	60,00	0,0481	2,88
	stand-by: start new sequence					
	t1_se_cor_320		00:02:25	60,00	0,0403	2,42
	stand-by: patient out and data archiving					
	Recorded end time	9:33:00				

Start	Action	End	Total time			
9:00:00	average head examination total	9:33:00	0:33:00	kW	Time	kWh
	sum scan time		0:18:17			18,28
	sum stand-by		0:14:43	15,00	0,25	3,68
	control calculation		0:33:00		**Total**	**21,96**

MEASUREMENT OF ENERGY CONSUMPTION

Summary to calculate patients per day in given mix

Please fill in orange cells

		Minutes
	Potential exam time per day (12h)	720
minus	Non-Availability (**equals to 2h fixed stand-by**)	120
	Available potential scanning time	**600**

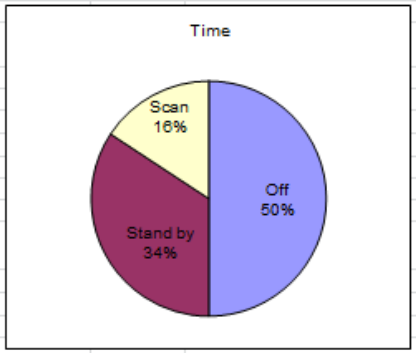
Product	**1.5 Tesla**
Product category	**B**

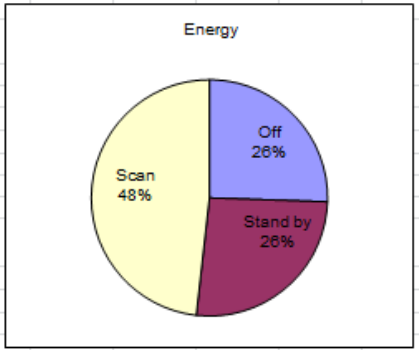
								Time per patient / h			Energy per patient / kWh			Energy per day
Start	Action	End	Duration	Distribution	Normalized	Min per day	optimized patients that can be treated within this timeshare	scan	stand by	total	scan	stand by	total	Total energy per day (10h)
9:00:00	average head examination total	9:33:00	0:33:00	25	24%	143	4,329	00:18:17	00:14:43	00:33:00	18,28	3,68	21,96	95,08
10:00:00	typical spine measurement (lumbar spine)	10:30:00	0:30:00	26	25%	149	4,952	00:15:03	00:14:57	00:30:00	15,05	3,74	18,79	93,04
11:00:00	typical abdomen measurement	11:29:00	0:29:00	25	24%	143	4,926	00:03:58	00:25:02	00:29:00	3,97	6,26	10,23	50,37
12:00:00	typical knee measurement	12:25:00	0:25:00	20	19%	114	4,571	00:09:24	00:15:36	00:25:00	9,40	3,90	13,30	60,80
13:00:00	typical angio measurement	13:23:00	0:23:00	9	9%	51	2,236	00:04:40	00:18:20	00:23:00	4,67	4,58	9,25	20,68
				105	1,0000	600	**21.015**							**319.97**

	Time in Min	kW	kWh
Energy for non-availability (2h for service, reliability etc. in which system runs in standy-by) ***fixed***	120	15,00	30,00
Off -time (12h) ***fixed***	720	10,00	120

Per day:	Time		Energy
	min		kWh
Off	720,00	10,00	120,00
Ready to measure	493,37	15,00	123,34
Scan	226,63	60,00	226,63
Sum of Energy per day for max. exams in given distribution	**1440,00**	**19,58**	**469,97**

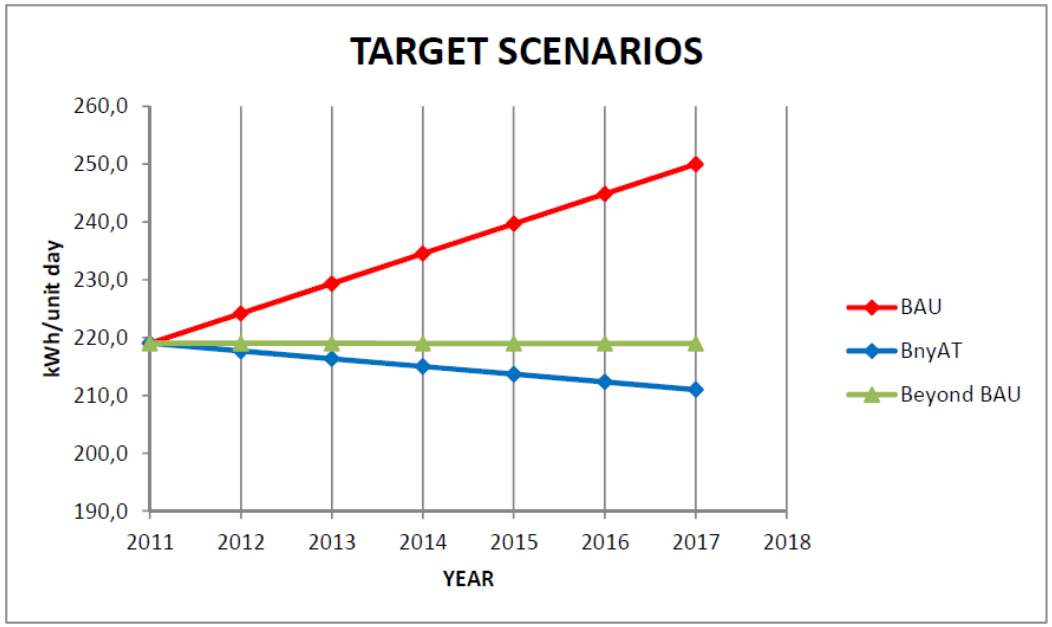
Average kWh/Patient	**22.36**





MRI ECODESIGN GOAL

- The MRI ecodesign goal was set in 2011.
- A maximum reduction potential in energy consumption of about 5,5% can be expected by 2017 compared to baseline 2011.
- At the same time an increase in energy usage around 12% is estimated due to increased functionalities (BAU)
- The methodology defined a BeyondBAU scenario involving a reduction of 1% compared to the baseline in 2011.

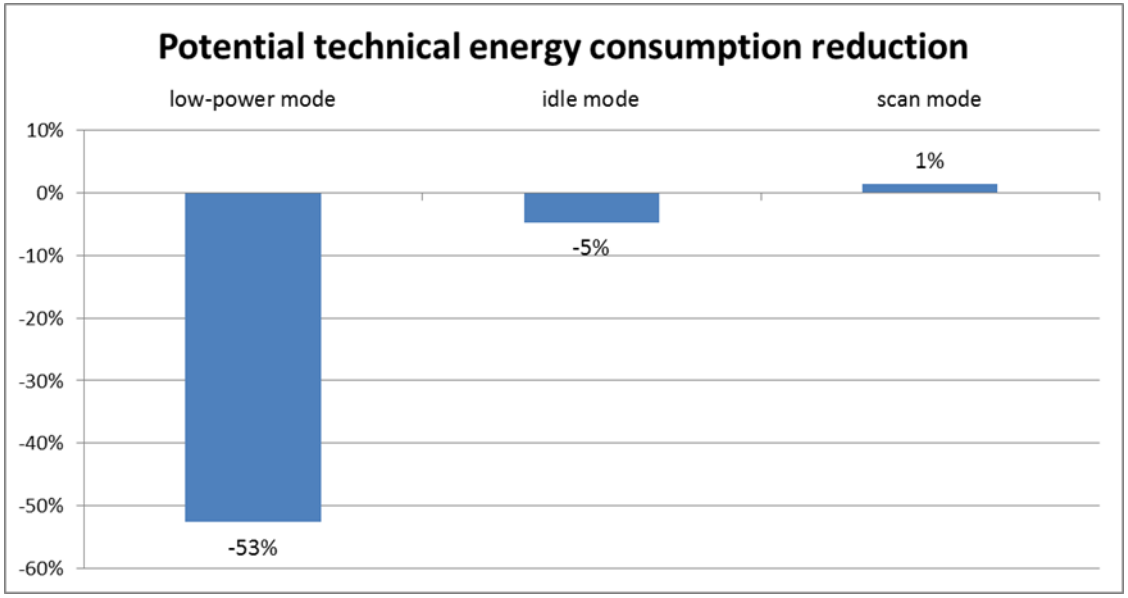


COCIR SELF-REGULATORY INITIATIVE
FOR MEDICAL IMAGING EQUIPMENT

COMPUTED TOMOGRAPHY

IMPROVEMENT POTENTIAL

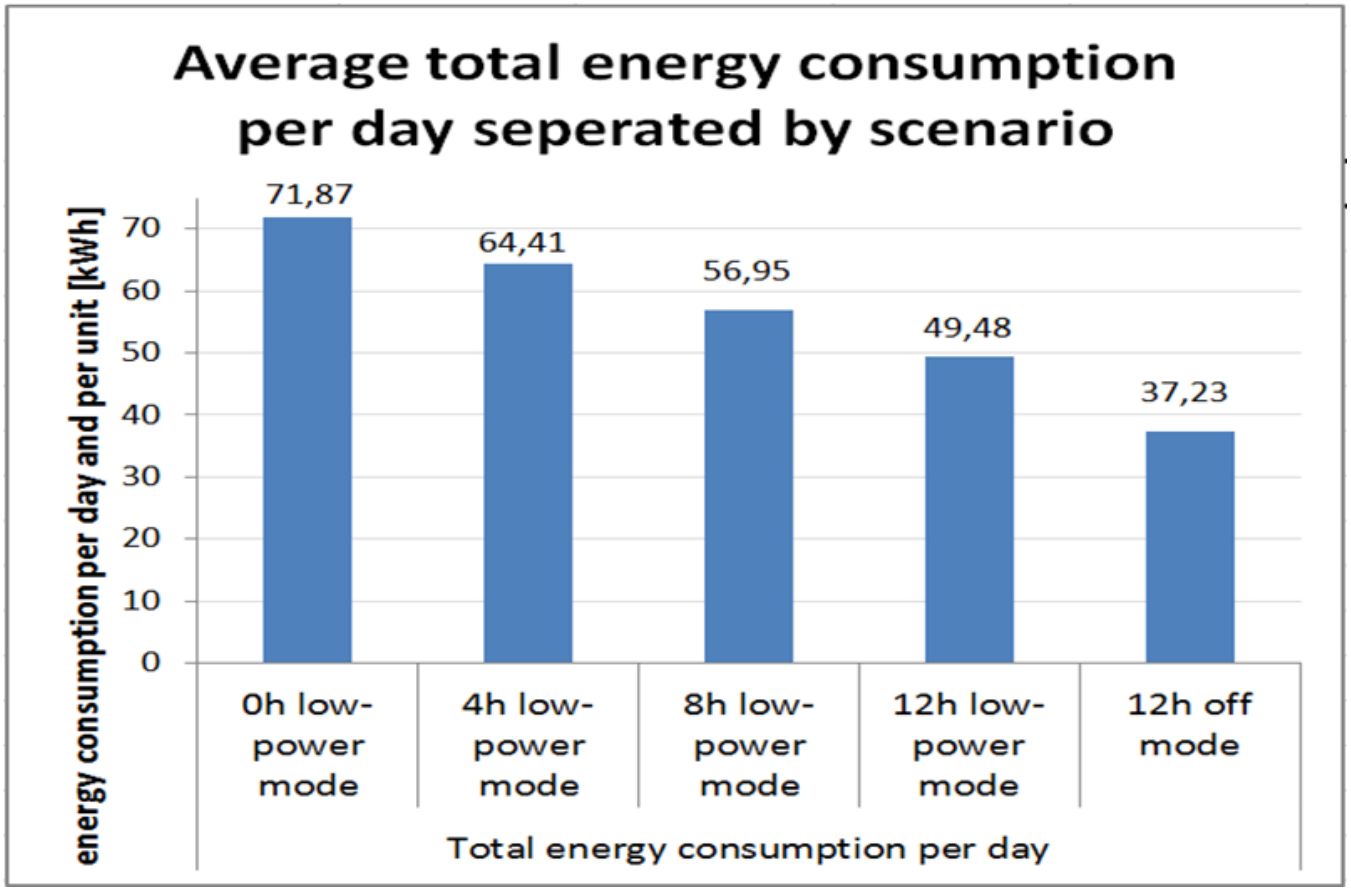
- The study on improvement potential shows limited improvement potential except for low-power modes.
- LowPower mode accounts for just a 24,5% of the total daily energy consumption and therefore the 53% improvement, even if possible, will end up in a 13% reduction.



LOW POWER MODE USAGE

- Some analysis of user behaviour showed that about 70% of CT scanners were never switched to Off/LowPower during the 12h night time.
- The remaining 30% of scanners, only 50% of the times on average.
- This means that, unless user behaviour can be influenced, any reduction of the device energy usage in LowPower mode may have a limited net effect for users (around 1,9%), since the LowPower mode is rarely used.

USER BEHAVIOR



SRI GOAL FOR CT

INFLUENCING USER BEHAVIOR

- **Information to users – User manual/information**
  - The user manual or user information will contain guidance on how to use the CT scanner in an environmental friendly way with the aim of saving as much energy as possible according to the clinical needs of the user. Instruction will be provided on how to switch the scanner into the energy saving modes and how to switch back to active modes to ensure the scanner is ready when needed.

- **Information to users – User training**
  - Training of specialists provided by the CT manufacturer could play an important role in changing user behaviour regarding energy consumption.

SRI GOAL FOR CT

INFLUENCING USER BEHAVIOR

Information to users – Energy information

The SRI SC commits to communicate to clients and users of CT scanners, in the technical documentation or by any other appropriate means the relevant information concerning the energy consumption in the following scenarios:

- **Scenario Off:** This value represents the daily energy consumption when the CT scanner is switched off during the 12h night time (no energy consumption).
- **Scenario LowPower:** This value represents the daily energy consumption when the CT scanner is switched to LowPower during the 12h night time.
- **Scenario Idle:** This value represents the daily energy consumption of the CT when it is left in idle mode for 12h during night time.

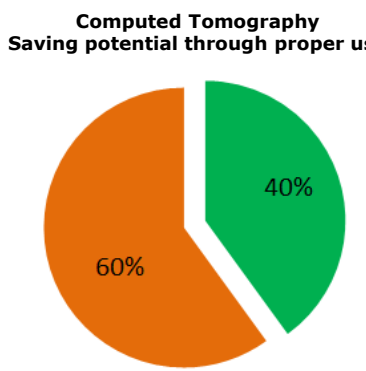
SRI GOAL FOR CT

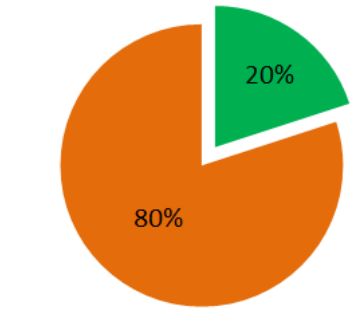
Format for communication of energy data

Typical Energy Consumption The typical energy consumption values have been measured according to the COCIR *Self-Regulatory Initiative CT Measurement of Energy Consumption*, version 1.0			
Model:			
Use Case Scenario*	Energy per Day	Units	Deviation, Justification
Idle	72	kWh	
LowPower	50	kWh	
Off	37	kWh	

COCIR COMPANIES WORKING TOWARDS GREENER HEALTHCARE

- COCIR Companies believe that proactivity is the best approach to achieve ambitious results in environmentally conscious Healthcare.
- Energy efficiency can be improved by manufacturers but the highest potential lies in usage patterns.
- Saving energy in medical imaging equipment is possible mostly in non-scanning modes. Therefore partnership between manufacturers and user is the key for the reduction of energy consumption.
- Partnering with suppliers up and down the supply chain through the use of structured tools and systems is the best approach to ensure success in management of substances.
- Green Public Procurement can boost greener technologies but without common benchmarks and reliable measurement methodologies, necessary for comparability, GPP can potentially distort the market.
- A coordinated and harmonized global approach to GPP is the best option to exploit the potential of GPP allowing companies to direct their development processes and investments.





THE WAY FORWARD

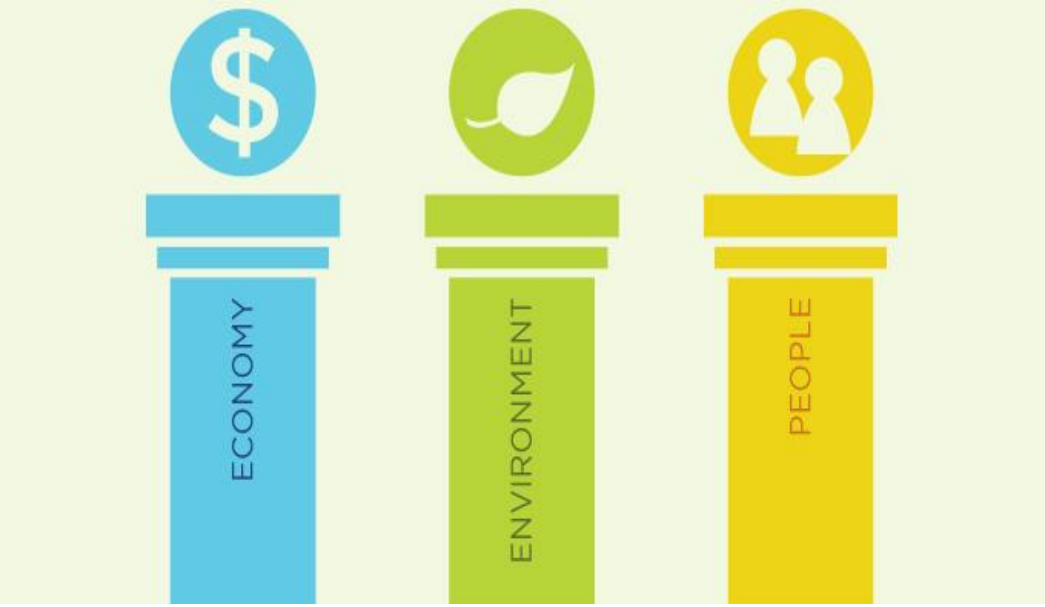
FROM ENVIRONMENT TO SUSTAINABILITY

LIMITS OF ENERGY CONSUMPTION FOCUS

- Potential reduction of energy consumption has been investigated for the modalities with higher environmental impacts and targets/goals have been set.
- Additional functionalities, diagnostic capabilities and benefits for patients and users are going to increase the energy consumption. Further reductions are very complex to achieve and may interfere with performances/functionalities.
- Companies have been adding energy saving options for the user to select. Nonetheless there is still room for improvement in user behaviour.
- For remaining modalities we expect similar conclusions: no significant impact (lower energy consumption, smaller number of equipment) and lower improvement potentials (mature technologies).

SUSTAINABLE MEDICAL DEVICES

- COCIR is launching new activities to work on new methodologies to "measure" or "assess" sustainability of medical devices.
- The objective is to explore indicators for environment, economy and patient benefits and the methodologies to measure them.
- While environmental indicators can be quantified by LCA, for other indicators new methodologies will be developed.



Examples of indicators:

- *Restricted materials*
- *Clinical performance*
- *Reimbursement capability*
- *Capability for treatment/diagnosis*
- *Product campaigns/education*
- *Scan speed*
- *Innovativeness*
- *Image quality*
- *Serviceability*
- *Reliability*
- *Design/product appearance*
- *User friendliness*
- *End of life options*
- *Affordability*
- *Reusability/Easiness for reusability*

SUSTAINABLE MEDICAL DEVICES

- The methodology provides a “picture” of sustainability which can be represented graphically with radar diagrams.
- Its is not different from the Environmental Footprint Methodology developed by the European Commission so far but it encompasses the three pillars and not only environment.
- The indicators can be weighted to get a single index