



PROGRAMA ALIANÇA

Indústria Sustentável, Brasil Competitivo

São Paulo City – August, 2018
Energy Efficiency for Competitiveness Improvement

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CNI

- ✓ *The Brazilian National Confederation of Industry - founded in 1938;*
- ✓ *CNI is the official and highest-level organization representing Brazilian industry;*
- ✓ *CNI is the main interlocutor with the executive, legislative, and judicial branches of government, as well as with several organizations and entities in Brazil and around the world;*
- ✓ *CNI represents Brazil's 27 state-level federations of industries and 1,245 sectorial employer's unions, to which almost 700,000 companies are affiliated with.*



CNI

- ✓ *In addition, CNI directly manages the following organizations:*
 - ✓ *Social Service of Industry (Serviço Social da Indústria – SESI);*
 - ✓ *The National Service of Industrial Training (Serviço Nacional de Aprendizagem Industrial – SENAI); and*
 - ✓ *The Euvaldo Lodi Institute (Instituto Euvaldo Lodi – IEL)*



CNI

- ✓ *CNI has been working in different strategies:*
 - ✓ *Off- Balance sheet financing – Abrace e World Bank;*
 - ✓ *Industry finance with low interest rates – Caixa e KFW;*
 - ✓ *Brasil mais produtivo: Eficiência Energética – MDICS, Senai e Procel – Small and medium industries;*
 - ✓ *Alliance Program – Large industries – Abrace, Procel, MME, MDIC and Senai.*



Program Concepts

- Twenty-four month voluntary partnership between the industry and CNI to foster energy efficiency in the energy-intensive industry.
- Focus on advanced engineering services provided by CNI experts to improve the energy intensity in 5% within 24 months
- No capital investment included (focus on 100% services)

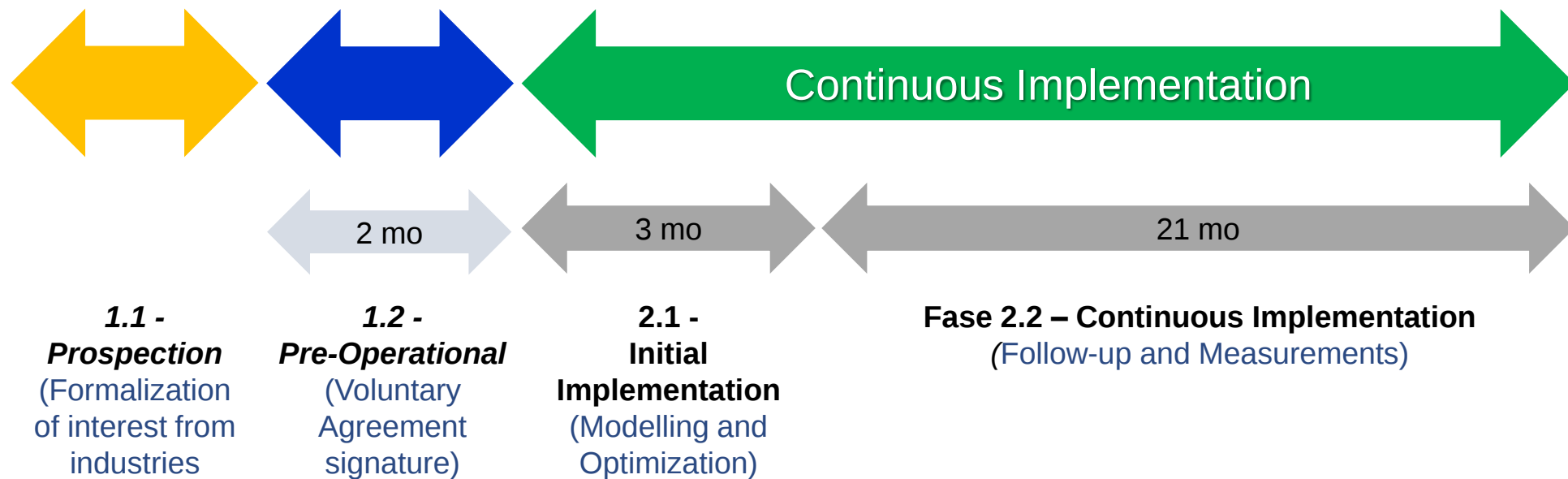
Energy Efficiency
(cost reduction and
energy consumption)

Sustainability
(water, waste and
emissions)

Productivity
(production increase
and quality
improvement)



Phases





CONTRACTS SCHEME



Partnership
Contract
→
50% Costs



Voluntary Agreement
(Formal Contract)
←
50% Costs



Example of a
participant industry

+ Other Sources in
Negotiation:

- KfW
- ANEEL
- Private Funds
-

↓
Service
Contract



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Center of Excellence

↗
Provides the
services



VOLUNTARY AGREEMENT: CNI and Partner Industry



CNI

- Methodology;
- Specialists;
- Sophisticated computing tools;
- Training;
- Contribution of up to R\$ 300.000,00

Partner Industry

- Minimum financial contribution of R\$ 300.000,00;
- Commitment of leadership with the implementation of the agreed energy efficiency opportunities.





Program Goals

- Work in 100 industrial plants in 5 years;
- Reduce operational costs in R\$ 500 M per year;
- Identify investment opportunities of R\$ 1 Billion;
- Create 2 more Centers of Excellence in industrial energy efficiency services;
- Reduce the energy intensity index in these plants by 5% within 24 months;
- Reduce 100 kt CO₂eq;



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*Center of
Excellence I*



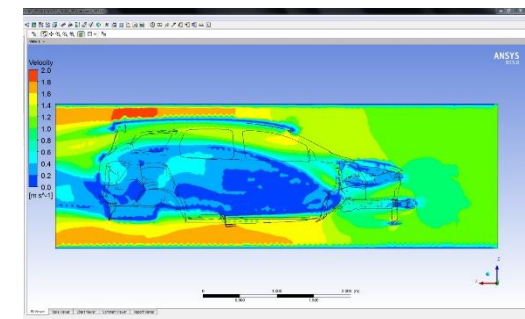
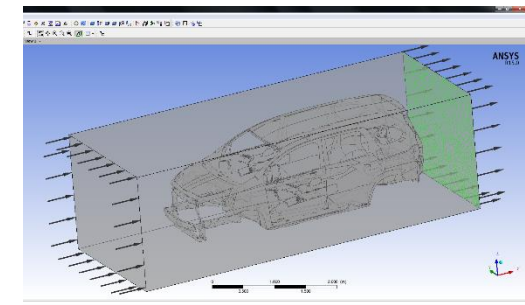
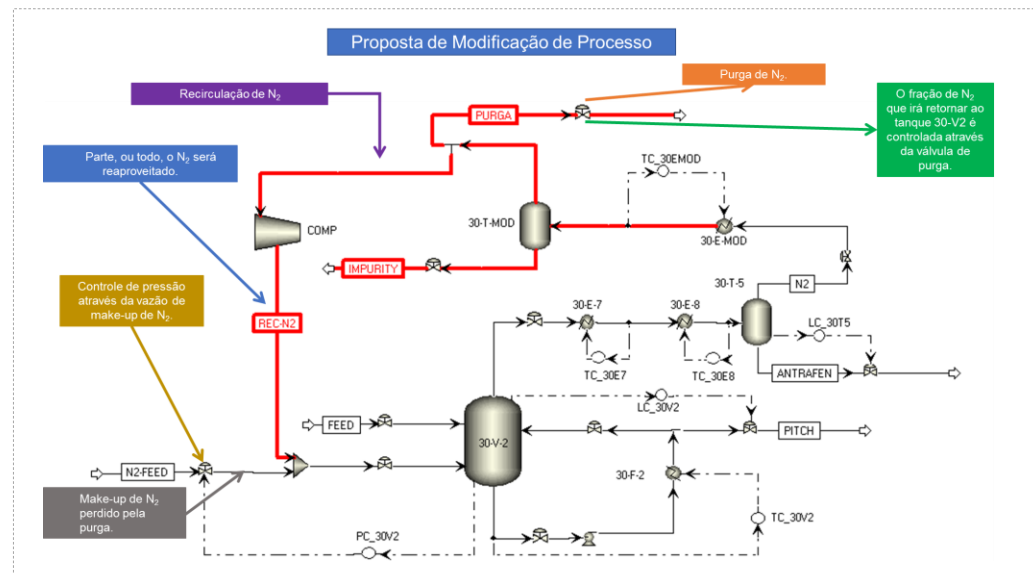
Industrial Partners

Química / Petro	Papel / Celulose	Mineração	Siderurgia	Alumínio	Ferro-ligas
 AkzoNobel Chemicals Answers Today	 BO PAPER INDUSTRIAL DE PAPEL	 ANGLO FERROUS BRAZIL  ARCONIC	 ArcelorMittal  CSN Centro Siderúrgico Nacional	 ALBRAS	 aperam
 Bayer	 Fibria	 CMOC	 GERDAU	 ALCOA	 Ferbasa
 Braskem	 PISA INDUSTRIA DE PAPEL	 HYDRO	 maringá	 ADITYA BIRLA NOVELIS	 LIASA
 CLARIANT	 SUZANO PAPEL E CELULOSE	 IMERYS	 thyssenkrupp	 RioTinto Alcan	 NOVA ERA SILICON S/A
 RHODIA SOLVAY GROUP	 WestRock	 Mineração Carajás S/A	 USIMINAS	 RIMA	
 DOW	 COTEMINAS	 PARANAPANEMA	 vallourec		
 SOLVAY	 Automobilístico	 SAMARCO			
 UNIPAR CARBOCLORO	 GM	 VALE			
		 cebrace	 ambev	 AIR LIQUIDE	 CIPLAN
		 GUARDIAN	 BRASIL KIRIN	 Linde	 Votorantim Cimentos
		 OWENS ILLINOIS	 Cargill	 WHITE MARTINS PREMIX INC	 Outros
		 WHEATON BRASIL	 Nestlé Faz Bem		 RANDOM IMPLEMENTOS



Technical

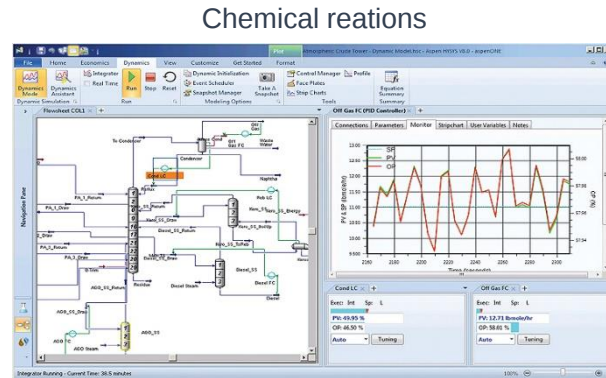
Improvements come from computational modellings in core processes to identify opportunities and implement actions to reduce energy and water consumption and waste generation:





Techhical Resources

- Software: Machine Learning, Fuzzy, CFX, Fluent, Matlab, Steam Modeler, Aspen;
- Labs for Water and Waste UFCG (Universidade Federal de Campina Grande);
- Cluster to run high speed modellings;

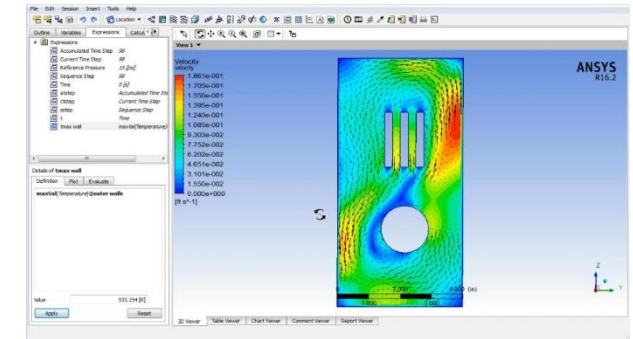


Chemical reations



← Cluster Computacional

Fluid-dynamics



Laboratório de Águas e Efluentes →

Instrumentação
de 1ª linha





Phase 1 – Initial Implementation=>

REPORT WITH MODELLINGS AND RESULTS

Report

Steam System Assessment
XXXXXX
Mmmsmsssmmm
XXXXX - SS, Brazil

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Management

Culture of energy efficiency is created/reinforced by supporting the actions implementation during the contract term through leadership participation



Seminars for Action Plan Construction



Phase 2 – Continuous Implementation => TOOL: DASHBOARD WITH PROJECTS/ACTIONS/INVESTMENT

CLARIANT - Painel de Gestão - Programa Aliança - 2017-2018

LINHAS DE AÇÃO x AÇÕES

Linha de Ação 1 - Aprimoramento Técnico em Utilidades				Responsável: André Mueller												
Ações	Operador	Data Inicial	Data Final	Suporte Aliança	Marco	Proposto	Realizado	A Concluir	OPEX (R\$)	CAPEX (R\$)	Total (R\$)	Resultado	Previsto	Alcançado	Saldo	Observações
Instalar nova bomba na Casa de Bombas V.	André Mueller	1-mar-17	30-jun-17		Nova bomba instalada.	1	1	0		120.000,00	120.000,00	Redução anual no consumo de energia (R\$)	43.500	16.300	27.200	No lugar da bomba posição A-520. Instalado nova bomba submersível de 80CV na posição A-530 em operação. Ganhos = 90,7 MWh/mês x R\$ 0,18 em jul/ago/set.
Instalar inversores de frequência nos ventiladores das torres de resfriamento A-400,A-410,A-420,A-430, A-700, A-750, A-800, A-850 e A-950.	André Mueller	1-mar-17	30-jun-17		Novo sistema com I/F instalado.	1	1	0		86.000,00	86.000,00				0	
Instalar contínuo blowdown.	André Mueller	1-mar-17	31-mar-18		1) Projeto aberto; 2) Projeto aprovado; 3) Projeto executado.	3	1	2			0,00				0	Reativação do tanque de "flash" + trocador de calor para recuperação de energia térmica da água de blowdown com a água desmi de makeup ou alimentação da caldeira + trocador para recuperação de calor do condensado contaminado com retorno de água desmi após polimento para tanque A-520.
Substituir air-lifts por bombas pneumáticas.	André Mueller	1-mar-17	30-jun-18		1) Sistema para instalação da bomba testado; 2) Projeto aberto; 3) Projeto aprovado; 4) Projeto executado.	4	1	3			0,00				0	Projeto piloto realizado até o dia 17/nov.
Instalar sistema de cogeração de energia elétrica.	André Mueller	1-mar-17	31-dez-18		1) Projeto aberto; 2) Projeto aprovado; 3) Projeto executado.	3	1	2		1.000.000,00	1.000.000,00				0	Projeto em aprovação junto ao MC (on hold).
Eliminar vapor utilizado no "vent" dos desaeradores.	André Mueller	1-jul-17	31-jul-17		1) Válvulas fechadas; 2) Execução da nota com follow up realizado.	2	2	0	292,00		292,00	Economia fruto da redução de consumo de vapor	67.000	67.000	0	Já notificado à operação para o desuso, com o fechamento da válvula. Aberto nota 50661256 para fechamento definitivo.
Instalar diversos pontos sem isolamento na geração de vapor.	André Mueller	1-jul-17	31-jul-17		Execução da nota com follow up realizado.	1	1	0	2.495,00		2.495,00	Economia fruto da redução de consumo de vapor	4.380	4.380	0	Linhas, conexões e válvulas, nota 50653028.
Realizar isolamento térmico das tampas de fundo da caldeira D400.	André Mueller	1-set-17	30-nov-17		1) Projeto aberto; 2) Projeto aprovado; 3) Projeto executado.	3	2	1	12.500,00		12.500,00	Economia fruto da redução de consumo de gás natural	28.740	28.740	0	Projeto em execução.
Ajustar queimador D430 da caldeira Aalborg.	André Mueller	1-jul-17	31-ago-17		1) Contrato reviso; 2) RC cadastrado; 3) Pedido cadastrado; 4) Serviços programados.	4	4	0	15.000,00		15.000,00				0	Contrato já renovado. Valor anual.
Instalar sistema de retorno de condensado diretamente no tanque de alimentação de água desmi A-520.	André Mueller	1-jul-17	31-dez-17		1) Projeto aberto; 2) Projeto aprovado; 3) Projeto executado.	3	1	2			0,00				0	
Instalar sistema de redução de pressão para alimentação dos desaeradores com eliminação de perda de vapor.	André Mueller	1-jul-17	31-mar-18		1) Projeto aberto; 2) Projeto aprovado; 3) Projeto executado.	3	1	2			0,00				0	Projeto aberto na base nº. BR0275/17, aguardando aprovação do MC.
								0			0,00				0	



Follow-up Meetings



Intitial Phase Results

- Industry 01
- Total Energy Cost: R\$ 62 M/y
- Actions from Aliança:
 - Total: R\$ 4,4 M/y (7,4%)
 - From Opex: R\$ 2,6 M/y (4,4%)
 - From Capex (<2a pb): R\$ 1,8 M/y (3,0%)
- Highlights:
 - Water consumption reduction: 22% (from Company water)

- Industry 02
- Total Energy Cost : R\$ 32 M/y
- Actions from Aliança :
 - Total: R\$ 5,3 M/y (16,7%)
 - From Opex: R\$ 2,9 M/y (9,1%)
 - From Capex (<2a pb): R\$ 2,4 M/y (7,6%)
- Highlights:
 - Water consumption reduction: 24% (from river)
 - All reactor (59) were modelled

- Industry 03
- Total Energy Cost : R\$ 633 M/y
- Actions from Aliança :
 - Total: R\$ 43,2 M/y (6,8%)
 - From Opex: R\$ 29,8 M/y (4,7%)
 - From Capex (<2a pb): R\$ 13,4 M/y (2,1%)
- Highlights:
 - Cycle of steel pot heating, consumption of N₂, higher gas recovery (BOF), steam reduction

- Industry 04
- Total Energy Cost : R\$ 38 M/y
- Actions from Aliança :
 - Total: R\$ 3,3 M/y (8,8%)
 - From Opex: R\$ 1,9 M/y (5,1%)
 - From Capex (<2a pb): R\$ 1,4 M/y (3,7%)
- Highlights:
 - Rotary furnace (higher production due to recovery of fines of dolomita), electrical modeling of EAF

- Industry 05
- Total Energy Cost : R\$135M/y
- Actions from Aliança :
 - Total: R\$ 8,8 M/y (6,5%)
 - From Opex: R\$ 4,8 M/y (3,5%)
 - From Capex (<2a pb): R\$ 4,0 M/y (2,9%)
- Highlights:
 - Modeling by using machine learning (reduction of Soda), higher efficiency for recovering boiler

- Industry 06
- Total Energy Cost : R\$220M/y
- Actions from Aliança :
 - Total: R\$ 11,4 M/y (5,2%)
 - From Opex: R\$ 5,1 M/y (2,3%)
 - From Capex (<2a pb): R\$ 6,3 M/y (2,8%)
- Highlights:
 - Electrical furnace modelling EAF, hot rolling gas consumption



Highlights of steel sector:

- Steel making (BOF) – higher recovery of industrial gases (for electricity production) by remodeling curves and meters;
- Temperature target reduction for steel tap (total leading time evaluation);
- Reduction of cycle for steel pot soaking;
- Modelling of EAF – better electrodes consumption and current/voltage stability;
- Reduction of N₂ in the carbo-chemical plant;
- Reduction of NG in the furnaces of reheating (hot rolling) by fluid-dynamics study (temperature set points);
- Cogen assessment (lower steam loss, electricity production, NG reduction, etc);
- Coke making optimization (temperature setpoint and process control improvement);



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Sustainable Industry, Competitive Brazil

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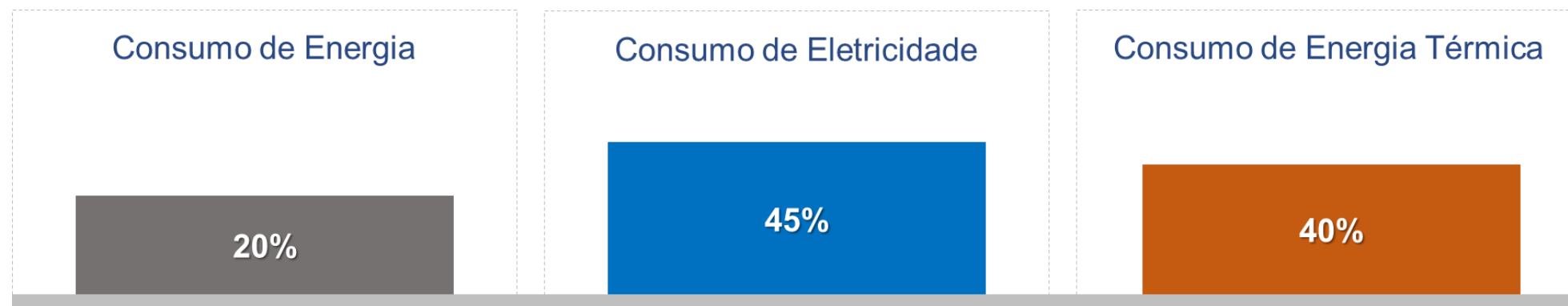
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Target Industry

Energy Intensive Industry ~150 companies



Supplier Chain
(~1,500 medium-size companies)