

# CLIMATE ACTION PROGRESS REPORT

KAUST Greenhouse Gas  
Emissions Overview

2018



جامعة الملك عبد الله  
للعلوم والتقنية  
King Abdullah University of  
Science and Technology

Health, Safety  
and Environment



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This report covers the reporting period from 2016/2017 to 2017/2018.

**Issued by:** Health Safety and Environment Department – Environmental Protection Unit

**Issued date:** October 2018

**Contributors:** Dr. Ana Margarida Costa, Sufyan Khan, Dr. Mohammed S. Omar

**Data Provided:** Facilities Management (electricity consumption and conservation efforts, refrigerants, energy generators and boiler fuel usage); Community Life (business and shuttle fleet fuel usage)

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**Annex: Greenhouse Gas Management Report 2016**  
Sustainability Sub-Committee

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# 01 REPORT CONTEXT

KAUST as a leading institution on advanced research with key focus areas that include energy and environment is uniquely positioned to address climate change challenges from its own operations and new developments.

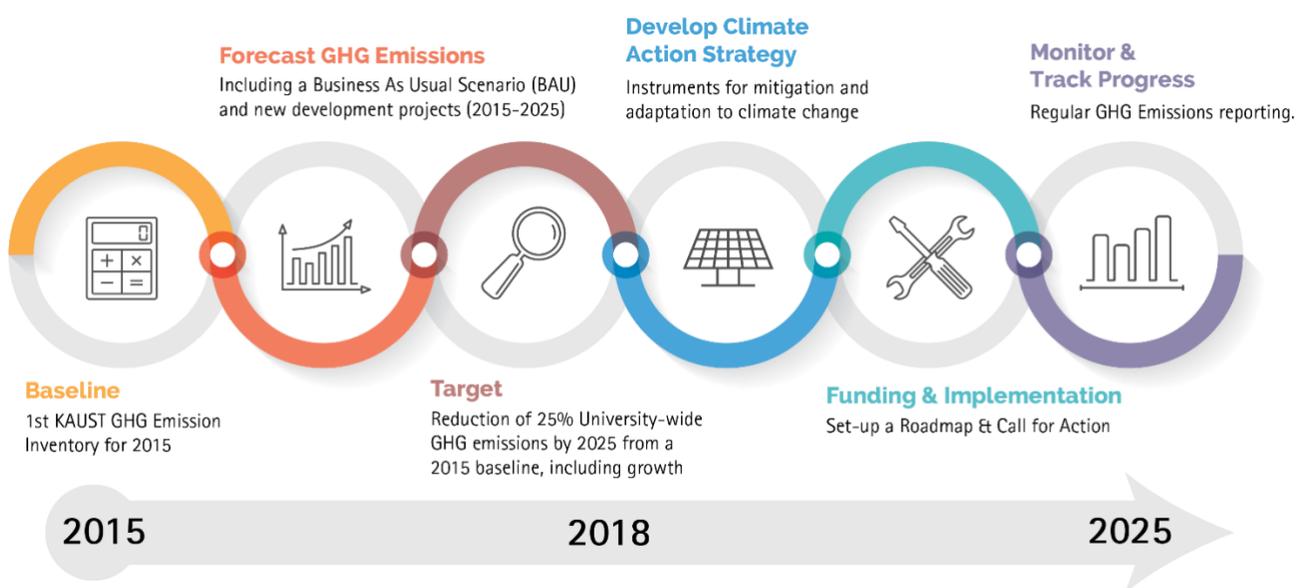
Guiding principles of University's Environmental Stewardship Policy calls for "eliminating or minimizing the adverse environmental impact of our operations". Greenhouse Gas (GHG) management was identified as an area that the University needs to address through Sustainability Sub - Committee, which in turn on July 2016 issued "Greenhouse Gas Management, Sustainability Sub-Committee Report" (Annex to this report). This report concluded with two key recommendations:

- I. KAUST's GHG are rapidly increasing, primarily due to current operations and expected growth of University's physical space. This would lead more than doubling of University's GHG emissions in the next ten years based on 2015 baseline, if mitigation steps are not put in – place.
- II. GHG reduction of 25% by 2025 has been recommended; this includes GHG emissions from existing baseline – 2015 operations as well as projected growth in University's physical space.

This Climate Action Progress Report 2018 is issued in – line with previous Sustainability Committee commitment to undertake "regular GHG emissions review, --- every other year" after its first report in 2016 on the subject. This current report is intended to gauge progress, challenges and provide recommendations.

Health, Safety & Environment Department is the lead author of the report with key data of the report being provided by Facilities Management and Community Life Organizations. We acknowledge the substantial energy conservation efforts being led by Facilities Management that is bearing some positive results in University's overall carbon footprint.

Challenges remain in having robust oversight process, institutional arrangement, and green financial instrument that will deliver the key recommendations outlined in the "Greenhouse Gas Management, Sustainability Sub-Committee Report". In addition, University-wide call to action is needed to address what is undoubtedly global issue.



↑ Climate Action timeline provides an overview of key milestones and roadmap.

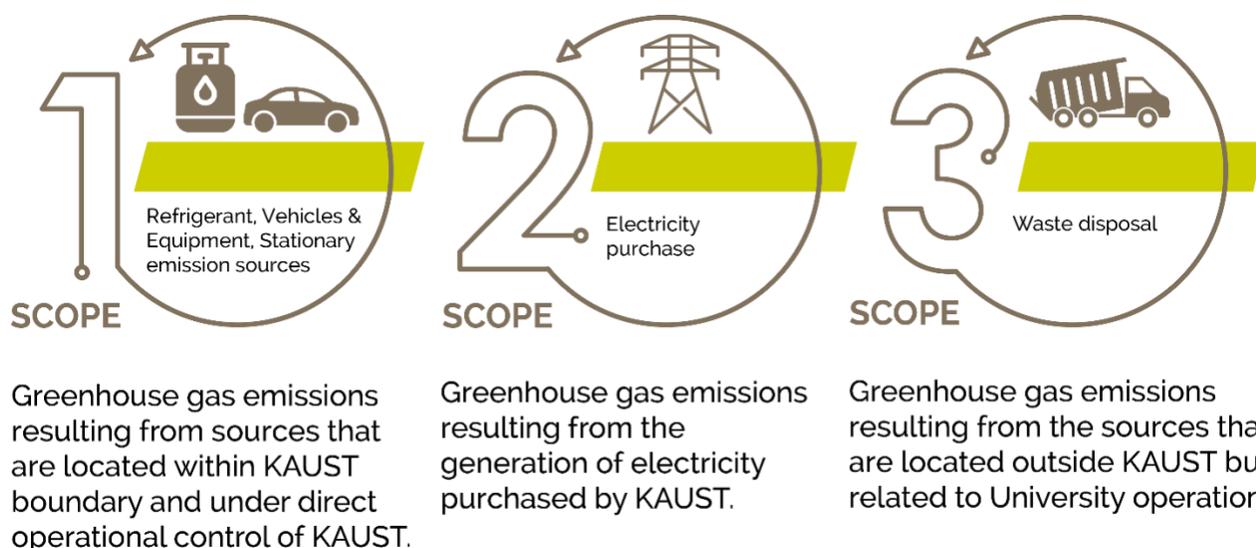
## 02 ACCOUNTING & VALIDATION METHODOLOGY

We have adopted an internationally accepted accounting methodology<sup>1</sup> to construct the KAUST GHG emissions profile. This methodology was supplemented by additional tools such as:

- The Climate Registry General Reporting Protocol,
- GHG Protocol Corporate Accounting and Reporting Standard from World Resource Institute & World Business Council for Sustainable Development,
- The National Committee for the Clean Development Mechanism in Saudi Arabia,
- Saudi Arabia specific electricity generation emission factors.

The inventory boundaries were based on an operational control approach that takes into account all the emissions from operations controlled by the University.

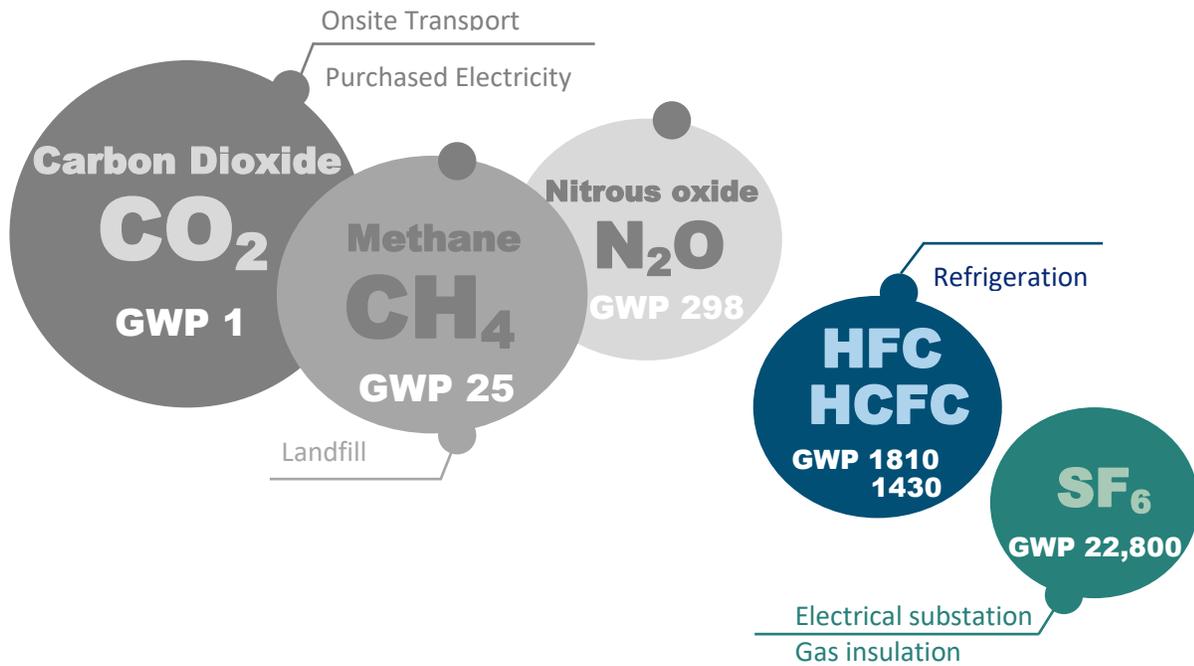
The University's GHG emissions were grouped as per the adopted methodology under three categories, namely, Scope 1, Scope 2, and Scope 3 as outlined in below figure.



↑ Methodology approach used in the GHG Emission inventory, provides overview of GHG sources included.

<sup>1</sup> Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Issued by the Greenhouse Gas Protocol, World Resources Institute and the World Business Council for Sustainable Development.

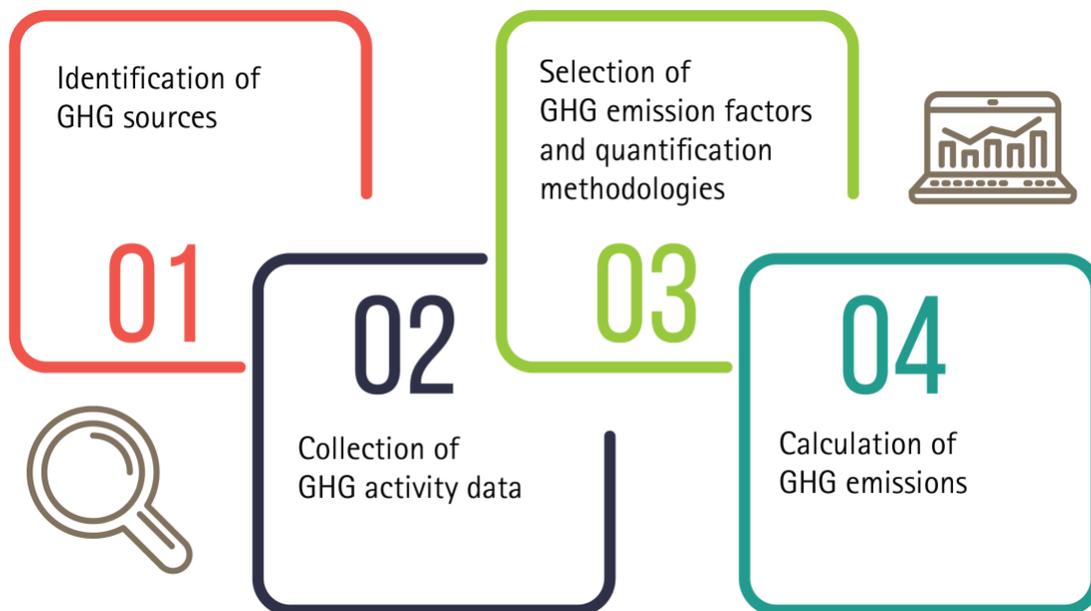
The GHG inventory covers the accounting and reporting of six greenhouse gases included in the Kyoto and Montreal Protocols.



↑ GHG included in the University's emission inventory.

GWP: Global warming potential compares the global warming impact of different gases. It is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO<sub>2</sub>).

The methodology used to quantify the GHG inventory can be summarized as follows:



# GHG Accounting Validation

We have brought in a third party auditing firm – Bureau Veritas to verify our GHG accounting and reporting practice. After extensive review of our current practices, we were delighted that the University was issued with the “Statement of Greenhouse Gases Accounting Validation” through ISO 14064-3, stating that the University’s GHG accounting and reporting complies with international standards and is “relevant, complete, consistent, transparent and accurate”.

**Complete**

**Transparent**

**Relevant**

**Consistent**

**Accurate**

**BUREAU VERITAS**  
Certification

**BUREAU VERITAS**  
1828

**STATEMENT OF GREENHOUSE GASES  
ACCOUNTING VALIDATION**  
*for*  
**KING ABDULLAH UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**  
THUWAL 23955-6900, KINGDOM OF SAUDI ARABIA

Bureau Veritas Saudi Arabia was engaged to conduct an independent validation of the greenhouse gas (GHG) emissions accounting methodology by KAUST for the period stated below.

**Scope of Validation**

1. GHG accounting compliance verification against international accepted GHG reporting protocol "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories"
2. Validation of GHG emission calculation and quantification methodology.

**Geographical Boundaries of GHG emission reporting**  
"Control Approach" - King Abdullah University of Science and Technology, Thuwal, Kingdom of Saudi Arabia site.

**GHG Emission Baseline Reporting Year**  
2015

**GHG Verification Protocol Used to Conduct Validation**  
We have conducted the validation in line with ISO 14064-3

**Conclusion**  
Based on our validation work and processes followed, we concluded:

1. The organization GHG accounting and reporting practice complies with the requirements of above "Scope of Validation", and it is relevant, complete, consistent, transparent and accurate.
2. The GHG emissions calculations and quantification methodologies complies with acceptable international practice.

**Date of Issue: 03-JUNE-2018**

*[Signature]*  
Certification Manager, Saudi Arabia

Managing Office Address: "Bureau Veritas (India) Pvt. Ltd." 72 Business Park, Marol Industrial Area, Opposite Seepz Gate No.2, MIDC Cross Road "C", Andheri - (East), Mumbai - 400 093, India

Local office: Al Raja Tower, 6<sup>th</sup> Floor, King Abdulaziz Road, P.O. Box 20189, Al-Khobar 31952, Kingdom of Saudi Arabia.

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↑ KAUST GHG Accounting Validation Statement.

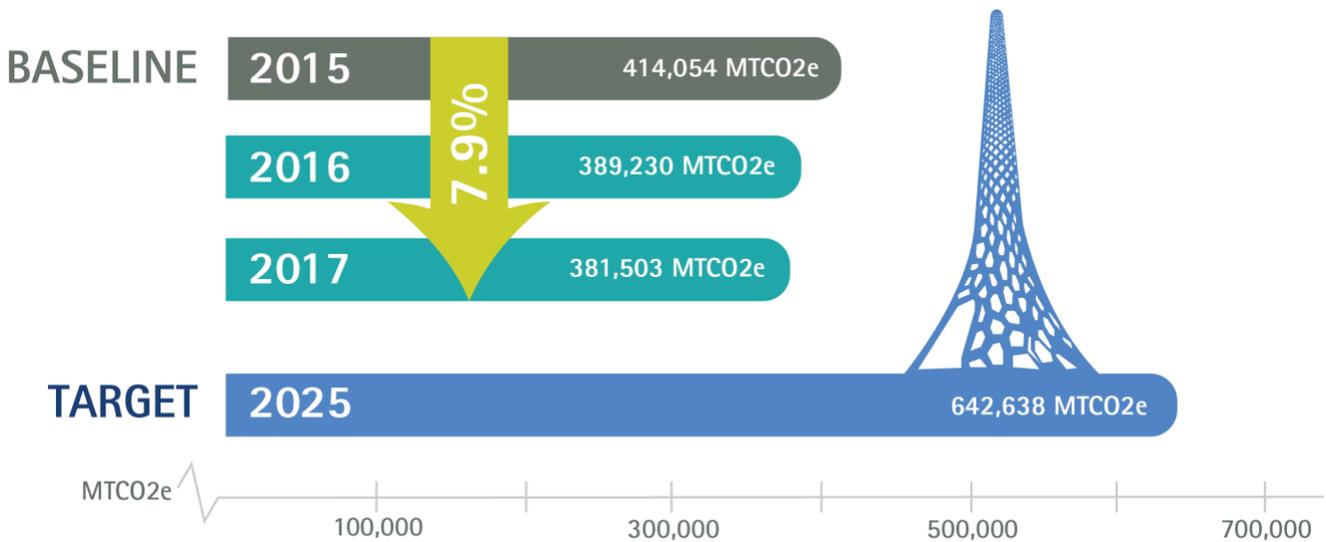
# 03 GHG EMISSIONS OVERVIEW & TARGET SETTING

The GHG emissions for 2015 were estimated to be 414,054 MTCO<sub>2</sub>e and defined as the baseline scenario for setting up a GHG reduction target. The University's GHG emissions are projected to be more than double by year 2025; primarily due to growth of University physical space and associated facilities operations. GHG emission reduction target of 25% from 2015 baseline, including both business as usual and forecasted emissions due to growth, has been targeted for 2025 year.



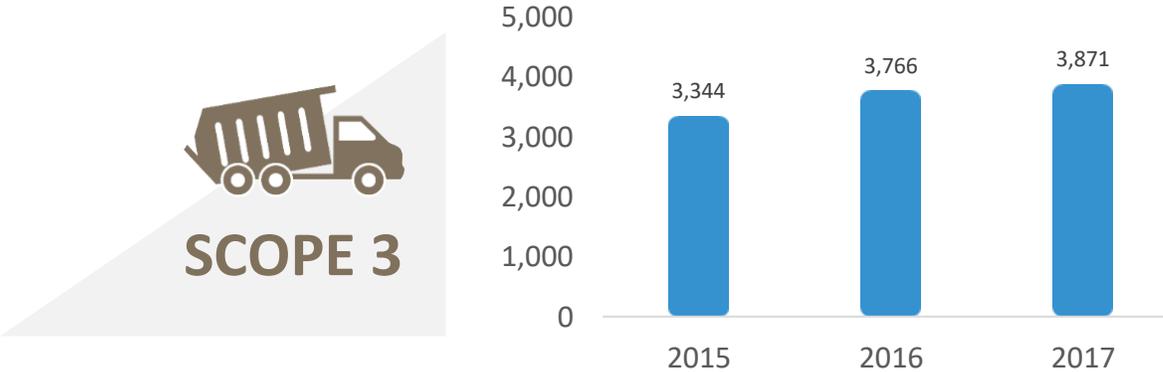
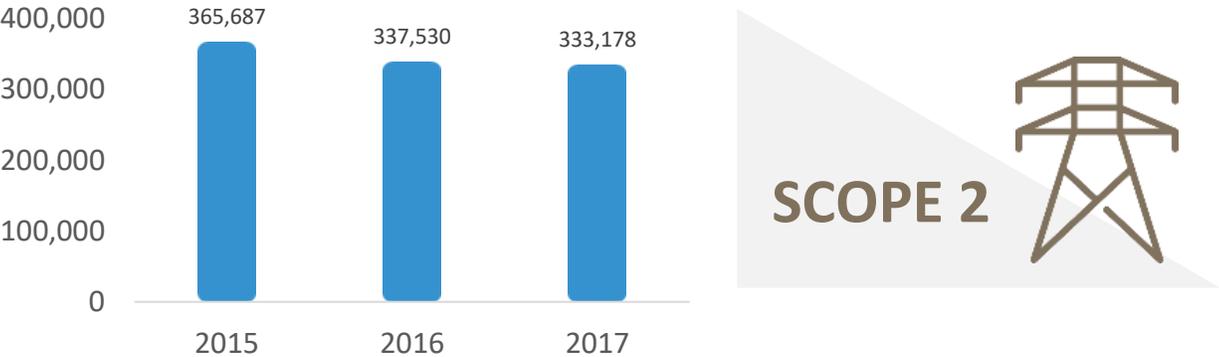
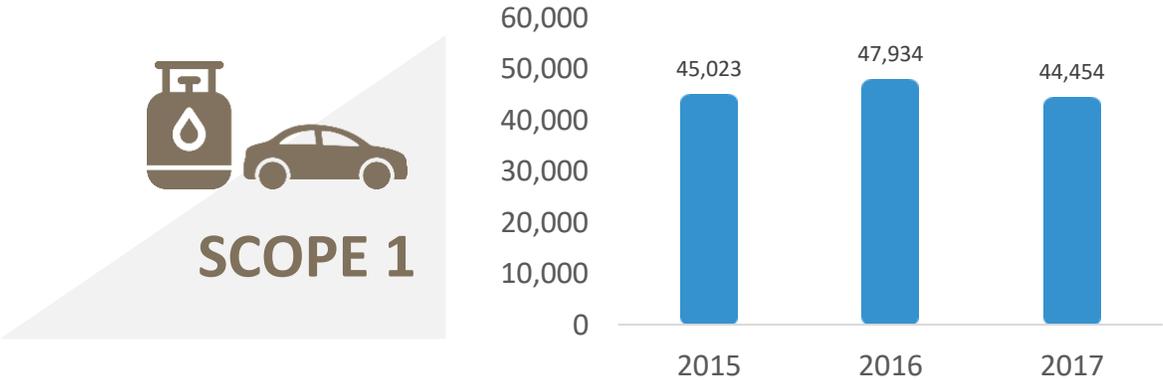
↑ Projected GHG Emissions (MTCO<sub>2</sub>e) for 2015-2025 and adopted target.

Figure below shows the GHG emissions over the last two years as compared to baseline emissions, along with 2025 target. Both 2016 and 2017 GHG emissions level continued downward trend, primarily due to energy conservation efforts championed by Facilities Management organization. There was a 7.9% reduction of the 2017 GHG emissions compared with 2015 baseline year.



↑ Actual GHG Emissions (MTCO<sub>2</sub>e) for 2015-2017 and adopted target for 2025.

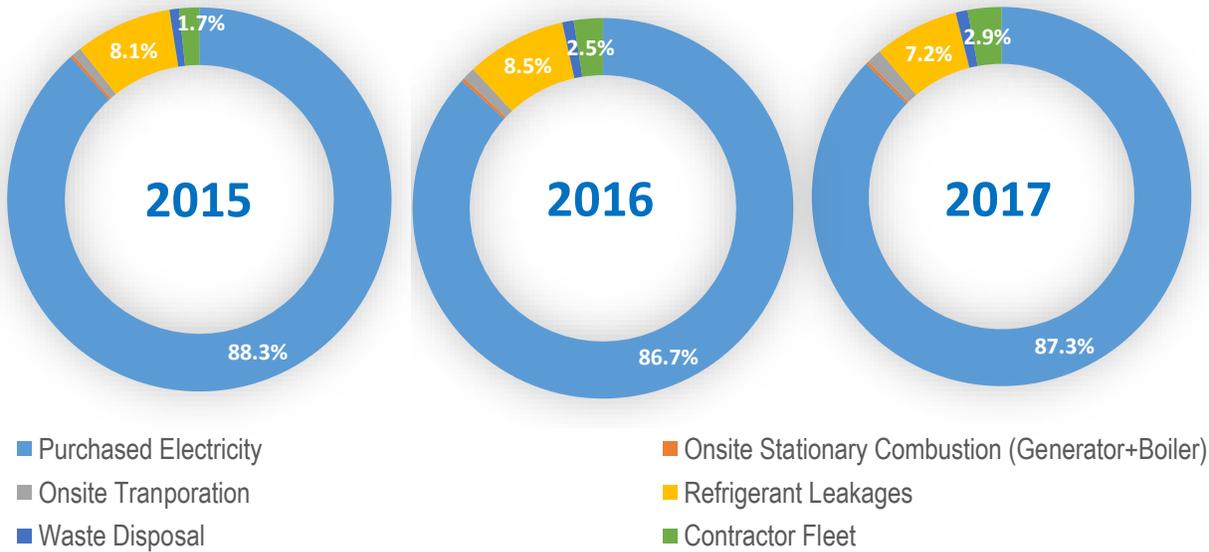
The distribution of GHG emissions by reporting categories indicates that Scope 2, which is associated with the purchase of electricity, is the main contributor to the University-wide GHG emissions during the last three reporting years.



↑ KAUST GHG emissions by scope categories (MTCO<sub>2e</sub>).

# 04 GHG EMISSIONS SOURCE CONTRIBUTION

The following figure indicates that purchased electricity is the main source of overall KAUST GHG emissions, followed by contributions from refrigerant leakages and contractor fleet.

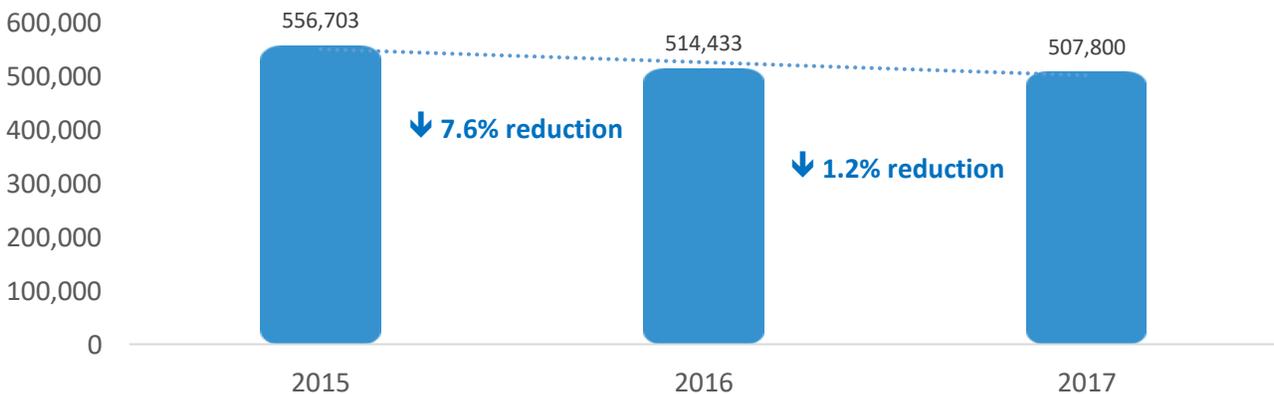


↑ GHG emission source contribution for the reporting years.

## 87% Purchased Electricity

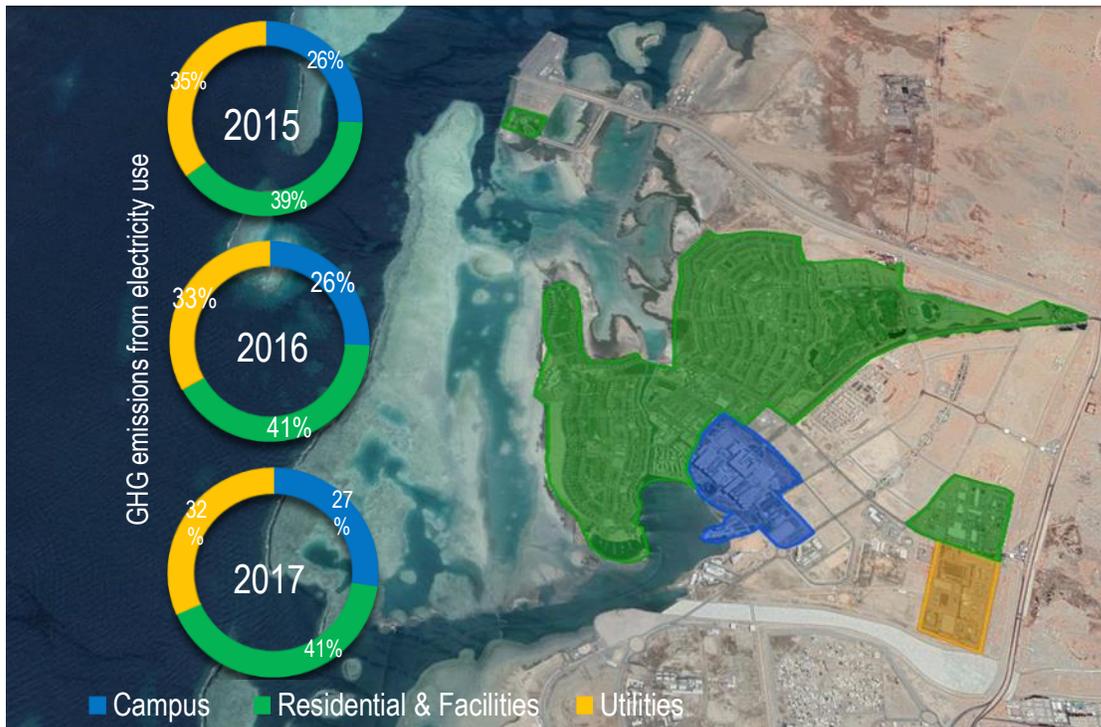
In 2017 purchased electricity remains the main contributor to overall KAUST GHG emissions

While the physical space of the University continues to grow, especially with the addition of energy intensive laboratory spaces, KAUST purchased electricity continue downward trend with 8.8% reduction since 2015.



↑ KAUST purchased electricity for the reporting years (MWh).

Residential & Facilities have the highest share of GHG related emissions, followed by Campus and Utilities. Utilities has KAUST wide support function to supply refrigeration, and potable and wastewater treatment.



↑ Breakdown of electricity associated GHG emissions by geographical areas.

## CURRENT SUCCESS STORIES TO OVERALL GHG REDUCTION



**Energy Audit**  
Completed energy audit of 9 campus buildings



**Conservation Efforts**  
54 initiatives undertaken to optimize and reduce overall campus electricity consumption



**Energy Reduction**  
Campus overall electricity consumption reduced by around 2.63% from baseline whilst 1850m<sup>2</sup> of laboratories space was added



**Process optimization**  
Streamlined utilities processes to gain an overall energy reduction of around 17,000 MWh



**Refrigerant Management**  
Instituted refrigerant recovery and recycling program for household and facilities air-conditioning units

# 05 MOVING TO A LOW-CARBON FUTURE



## Climate Action Plan

Develop a Climate Action Plan to outline implementation guidelines for mitigation and adaptation to climate change at the University



## Renewable Energy

Increase the University's onsite renewable energy portfolio



## Energy Conservation

Continue the initiated energy conservation actions to reduce University GHG emissions



## Energy Intensity Reduction

Set-up an energy intensity reduction target by facility type



## Green Construction Strategy

Develop a green construction strategy across the University



## Green fund

Advance Green fund instruments to support the transition to a low-carbon, resource efficiency processes within the University



## Monitor GHG Reduction Target

Set-up an independent and clear oversight body to monitor GHG reduction target



## Data Collection

Establish a clear and robust process for collecting and reporting quality data related to GHG management



## Scope 3 - GHG emissions

Account for air business travels



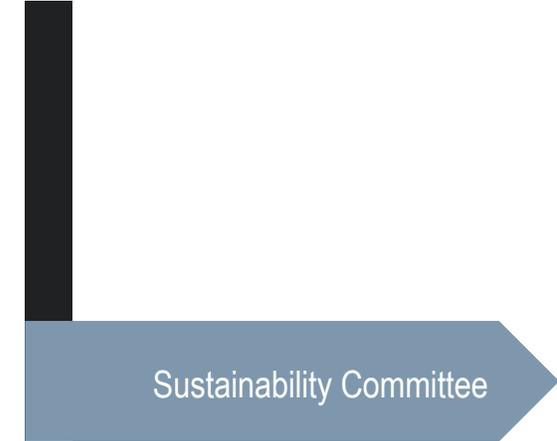
## Empowering communities

- Develop Community – wide engagement initiatives to support University's GHG reduction efforts
- Develop a Climate Change training program for KAUST staff and contract personnel

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**Annex: Greenhouse Gas Management Report 2016**  
**Sustainability Sub-Committee**

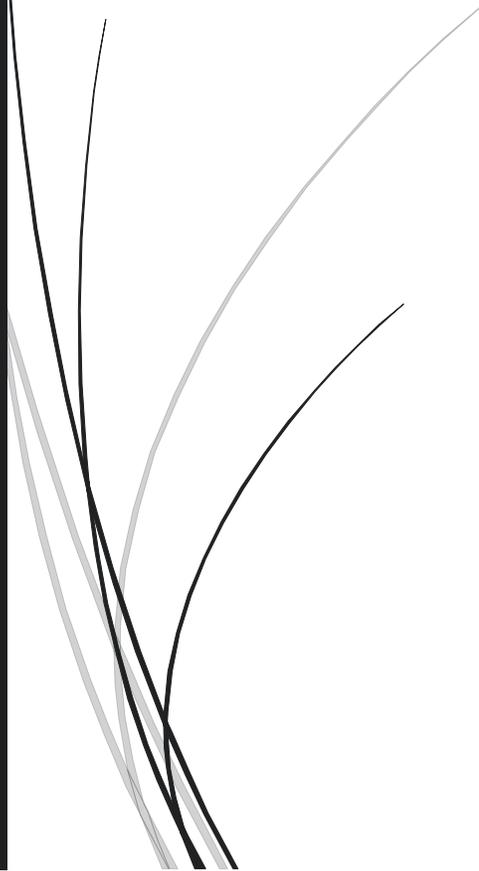
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Sustainability Committee

# Greenhouse Gas Management

Sustainability Sub – Committee Report



July 2016

# EXECUTIVE SUMMARY

Greenhouse Gas (GHG) management from University operations and new developments was tabled as a discussion item in the Sustainability Committee meetings on August, and November 2015. Subsequently, a Sustainability Sub – Committee were formed by the Sustainability Committee Chair, Antonio S Valenzuela on November 23<sup>rd</sup>, 2015 to address this issue<sup>1</sup>.

The mandate of the Sub – Committee was in part “to deliberate and recommend GHG management strategy to the whole Sustainability – Committee, which in – turn would advise the Executive Vice President for Administration and Finance. Key item for the work of the Sub – Committee is to identify GHG management strategy that must include, but not limited to GHG reduction target.”

The Sustainability Committee recognizes the fact that our academic departments are involved in cutting edge teaching and research that is relevant to addressing GHG management at a global level<sup>2</sup>. As such, addressing GHG at facilities operational level and new developments is prudent.

The Sub – Committee started its work on January 11<sup>th</sup>, 2016, and held number of individual meetings and discussions with various University stakeholders, including facility management teams, engineering and project management teams, as well as contractors, and as such our work and recommendations have been informed by data gathered from these stakeholders<sup>3</sup>.

The Sub – Committee have identified five key areas to inform its work and recommendations; namely:

1. GHG Emissions Accounting Methodology,
2. Future Growth and Master Planning,
3. Utilities and Associated Data,
4. GHG Teaching & Research Contribution, and,
5. GHG Reduction Target Setting.

The Sub – Committee members were assigned to work on different key areas identified above, while the overall coordination work of the Sub – Committee was assigned to Dr. Mohamed Omar, Environmental Protection Manager of Health, Safety and Environment Department. Based on the data collected to date, carbon footprint of the University was developed<sup>4</sup>. The Sub – Committee made its final recommendations to the Sustainability Committee on May 18<sup>th</sup>, 2016, and was endorsed by such.

Key recommendation of the Sub – Committee are listed in the subsequent section of this report, and centers around three key areas:

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<sup>1</sup> The Sub – Committee mandate, and its members are presented in Appendix 1.

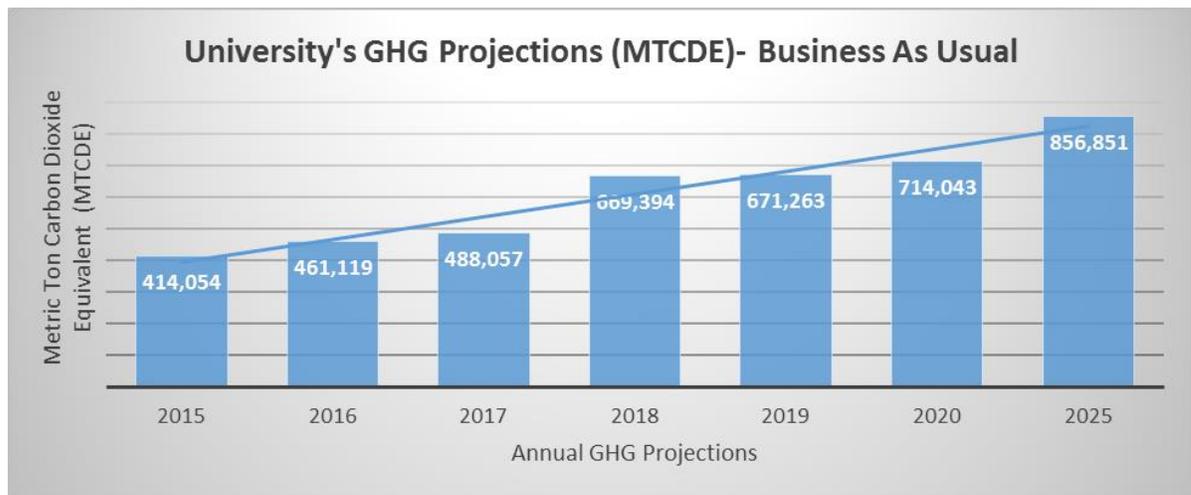
<sup>2</sup> Selected list of University’s teaching courses and research in the area of GHG management are provided at Appendix 2

<sup>3</sup> List of stakeholders engaged and data provided are listed in Appendix 3.

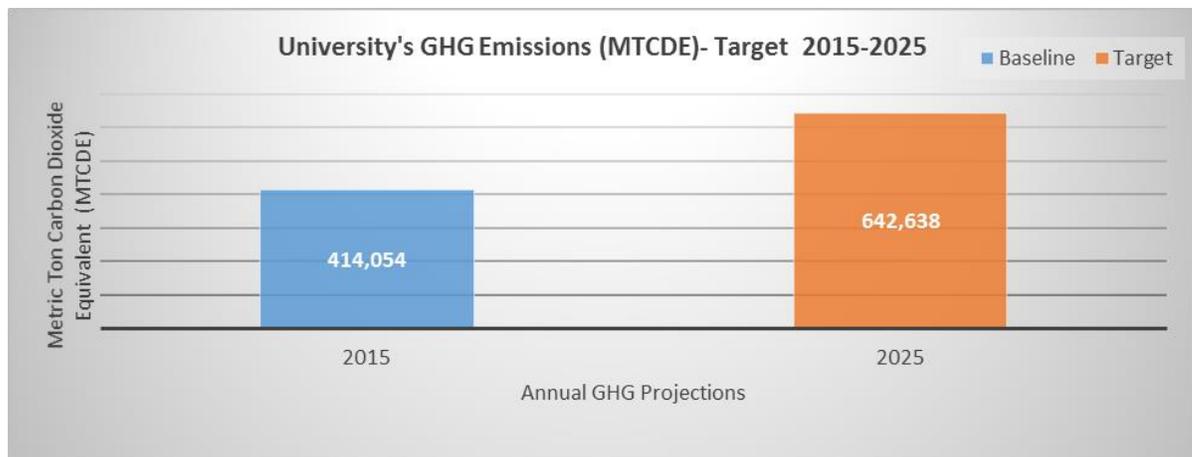
<sup>4</sup> Draft inventory of University’s current GHG emissions and projections are provided in Appendix 4.

# EXECUTIVE SUMMARY

1. KAUST should take leadership role in the area of addressing GHG emissions from its operations and new developments, given its teaching and research role, and the fact that number of its international peers are taking such steps. This is coupled with the recent global development in Paris, France to address climate change;
2. KAUST's GHG are rapidly increasing, primarily due to current operations and expected growth of University's physical space. This would lead more than doubling of University's GHG emissions in the next ten years based on 2015 baseline, if mitigation steps are not put in – place;



3. GHG reduction of 25% by 2025 has been recommended; this includes GHG emissions from existing baseline – 2015 operations as well as projected growth in University's physical space.



# RECOMENDATIONS

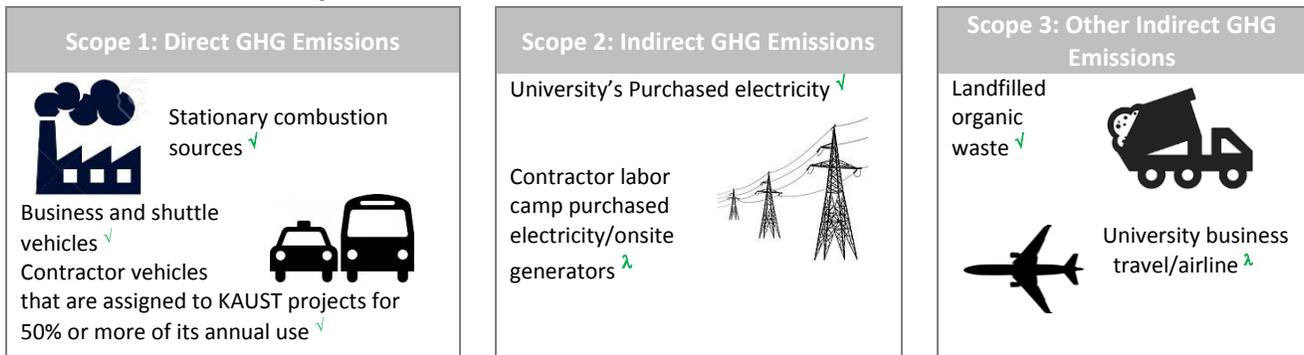
## 1. GHG Accounting Methodology

**Adopt an internationally accepted methodology for accounting University’s GHG that is “relevant, complete, consistent, transparent and accurate.”** We recommend using World Business Council for Sustainable Development *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. An Accounting and Reporting Standard for Cities*<sup>5</sup>. This protocol should be supplemented by other industry and local tools such Saudi Arabia specific electricity generation emission factors, The Climate Registry General Reporting Protocol, GHG Protocol Corporate Accounting and Reporting Standard from World Resource Institute & World Business Council for Sustainable Development, along with relevant data from The National Committee for the Clean Development Mechanism in Saudi Arabia.

## 2. Geographic, GHG Emissions Scope, Type & Organizational Boundaries

**Set up clear geographic scope, organizational boundaries and emissions list for GHG accounting.**

We recommend using “Control Approach” of GHG Accounting Methodology for the accounting of University’s GHG emissions. This would entail the inclusion of all GHG emissions that we have full control, e.g. operational or financial control – University facilities including Research Park, residential and associated facilities; and new construction projects. Below chart identifies recommended GHG emissions that should be included<sup>6</sup> in University’s official GHG records, and what other GHG emissions the University shall acknowledge.



### GHG Emissions To Be Reported

#### List of GHG Gases to be Reported

Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>).

✓ : Include in University’s official GHG records,

λ : Acknowledge for visibility, engagement and leadership, don’t include in University’s official GHG records

<sup>5</sup> *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. An Accounting and Reporting Standard for Cities* has been developed by World resource Institute, Cities Climate Leadership Group – C40, and Local Governments for Sustainability – I.C.L.E.I.

<sup>6</sup> GHG emissions scope or reporting is based on is based on *GHG Protocol Corporate Accounting and Reporting Standard* from World Resource Institute & World Business Council for Sustainable Development

# RECOMENDATIONS

## 3. Reduction Target

**Adopt official, absolute and time – bound GHG reduction target.** The University's 2015 GHG emissions were 414,054 Metric Ton of Carbon Dioxide Equivalent (MTCDE.) University's GHG emissions are projected to slightly be more than double by year 2025, 856,851 MTCDE; primarily due to growth of University physical space and associated facilities operations. We recommend formal and absolute reduction target of 25% by 2025 including growth. Such reduction goal shall be cascaded to various University entities that are contributing to University's carbon footprint. University's current GHG emissions, as well as projections of upcoming years are detailed in Appendix 4

## 4. Energy Intensity Reduction Target

**Investigate the feasibility of setting up *formal and concurrent*, energy intensity reduction target.** In the year 2015, about 88% of University's GHG emissions were contributed by the use of energy; we recommend looking into the feasibility of identifying and implementing energy intensity reduction target, such matrix could be energy intensity per square meter of facility type.

## 5. Demand Management & Energy Conservation

**Build on the initiated energy conservation initiatives to reduce University GHG emissions.** Energy demand by various University entities is a key driver for University's current as well as projected GHG emissions. Such energy consumption are driven by the operation of facilities and utilities, residential units, and research enterprise energy consumption. We see this as a challenge and opportunity, and recommend on embarking University – wide aggressive energy conservation and demand management that includes community, faculty and students. This is critical from demand management perspective as the energy load of such activities are in many cases demand driven.

## 6. Staff GHG Management Capacity

**Undertake a review of staff GHG management capacity.** Responding to the challenges of addressing GHG management at a University level requires a general understanding of the challenges of *Climate Change*, and investing in the development of our staff to address such challenges from operational perspective. We recommend undertaking a review of critical skills needed within our work force to address such, and propose a path forward and *Minding the Gap* strategy if any.

## 7. Regular GHG emissions review

**Establish formal GHG emissions review.** This review shall be every – other year, comprehensive, and associated findings and recommendations shall be adoptive in the light of new GHG mitigation technologies and research, energy conservation performance, University needs, as well as environmental regulatory development.

# RECOMENDATIONS

## 8. Green Construction Development.

**Embrace formal green construction development strategy across the University.** As the University grows, additional plug load, facilities and associated utilities are expected to increase. We recommend all capital projects, additional facilities and plug load to formally consider sustainability in their planning. This would include, but not limited to adopting US Green Building Council approach or similar for all new buildings, including sustainability consideration into the procurement guidelines for research and facilities equipment and so on.

## 9. Onsite Renewable Energy

**Increase University's onsite renewable energy portfolio.** As a higher education institution that is engaged in science and technology, embracing full range of sustainable forms of energy to power our energy needs positions the University well within its global peers. In 2015, onsite renewable energy in the form of solar rooftops for Buildings 3, 4, and CMOR accounted for an average of about 10% of buildings' electricity use. We recommend increasing such capacity for onsite renewable energy generation. In addition, PV installation and performance study commissioned by Technology Application and Advancement Group of Innovation and Economic Development at nine residential houses at KAUST revealed that some of the installation were able at times to provide up to 30% of the houses' electricity needs. Current financial market, and return on investment might not support such tested onsite renewable energy – PV. However, we recommend the University to invest in this area as a leader and commitment to sustainability.

## 10. GHG Emissions Organizational Oversight & Monitoring System

**Set up an independent and clear oversight body to monitor GHG reduction target.** In order to systematically monitor commitment under GHG reduction target, we recommend clearly identified oversight organization to monitor and report progress, along with local representation at individual organizational level. We also recommend setting up Information Technology - online GHG monitoring tools with senior management visibility.

## 11. Data Quality Assurance

**Enact robust, and verifiable process for validating GHG data.** Greater emphasizes need to be made to the quality of data necessary for GHG informed decision making. We recommend establishing clear and robust process for collecting and reporting quality data related to GHG management. This includes but not limited to electricity consumption data, new projects energy load estimates, fleet and onsite equipment fuel use data, utilities data, as well as emission factors data.

## 12. Sustainability Financial Instruments

**Embrace flexible and forward looking sustainability financial instruments.** Achieving GHG emissions reduction recommended here would need embracing a range of financial tools to empower our

# RECOMENDATIONS

organizations to work on such target. We recommend enacting financial mechanism such as “Green Loans” where GHG emissions reduction projects could be financed through.

## 13. Contractors Involvement

**Engage University’s key contractors and service providers in GHG management efforts.** University’s contractors play a key role in managing University’s day – to – day operations, and as such it is vital that they are engaged in our efforts to manage GHG emissions. We recommend contractors to have site specific plans to identify GHG management opportunities and engagement. In addition, we recommend contracts to develop their own accounting of GHG emissions related to their labor camps outside KAUST, and report such to KAUST on a regular basis.

## 14. Community & Academic Engagement

**Develop Community – wide participation plan, and academic engagement initiatives to support University’s GHG reduction efforts.** Our community and academic partners play a unique role in fostering a sense of sustainability, and as such their engagement is critical in realizing GHG reduction efforts. We recommend a community – wide annual celebration of progress in addressing GHG management; active involvement of graduate students, The KAUST School through fun and collaborative work; encouraging the concept of “living laboratory” and use our facilities to test innovative and sustainable solutions from our academic and research units.

## 15. GHG Reduction Implementation

**Develop Implementation Plan based on the recommendations of the Sustainability GHG Management Sub – Committee.**



**Subject: Greenhouse Gas Management Strategy**

From: Antonio S Valenzuela, Sustainability Committee Chair

November 23, 2015

To:

- Torove Leiknes, Professor of Environmental Sciences
- Jorge Rosas, Student
- Dr. Carol Carmichael, Sustainability Committee Member
- Marc Jackson, E&PM Director
- Aiman Bakr, Manager Residential Services
- Muna Khris, HVAC Energy Specialist
- Dr. Mohamed Omar, Environmental Protection Manager

Dear All,

Greenhouse Gas (GHG) management from University operations was tabled as an agenda item in the last two Sustainability Committee meetings. The need to set up a Sub – Committee to define a strategy to respond to this important matter has been recommended as a way forward. As a result, you have been nominated to participate in this sub-committee, we feel the Sub – Committee would benefit from your perspective and experience.

The Sub – Committee is to deliberate and recommend GHG management strategy to the whole Sustainability Committee, which in-turn would advise the Executive Vice President for Administration & Finance. Key item for the work of the Sub – Committee is to identify a GHG management strategy that must include, but not limited to GHG reduction goal, e.g. Figure 1.

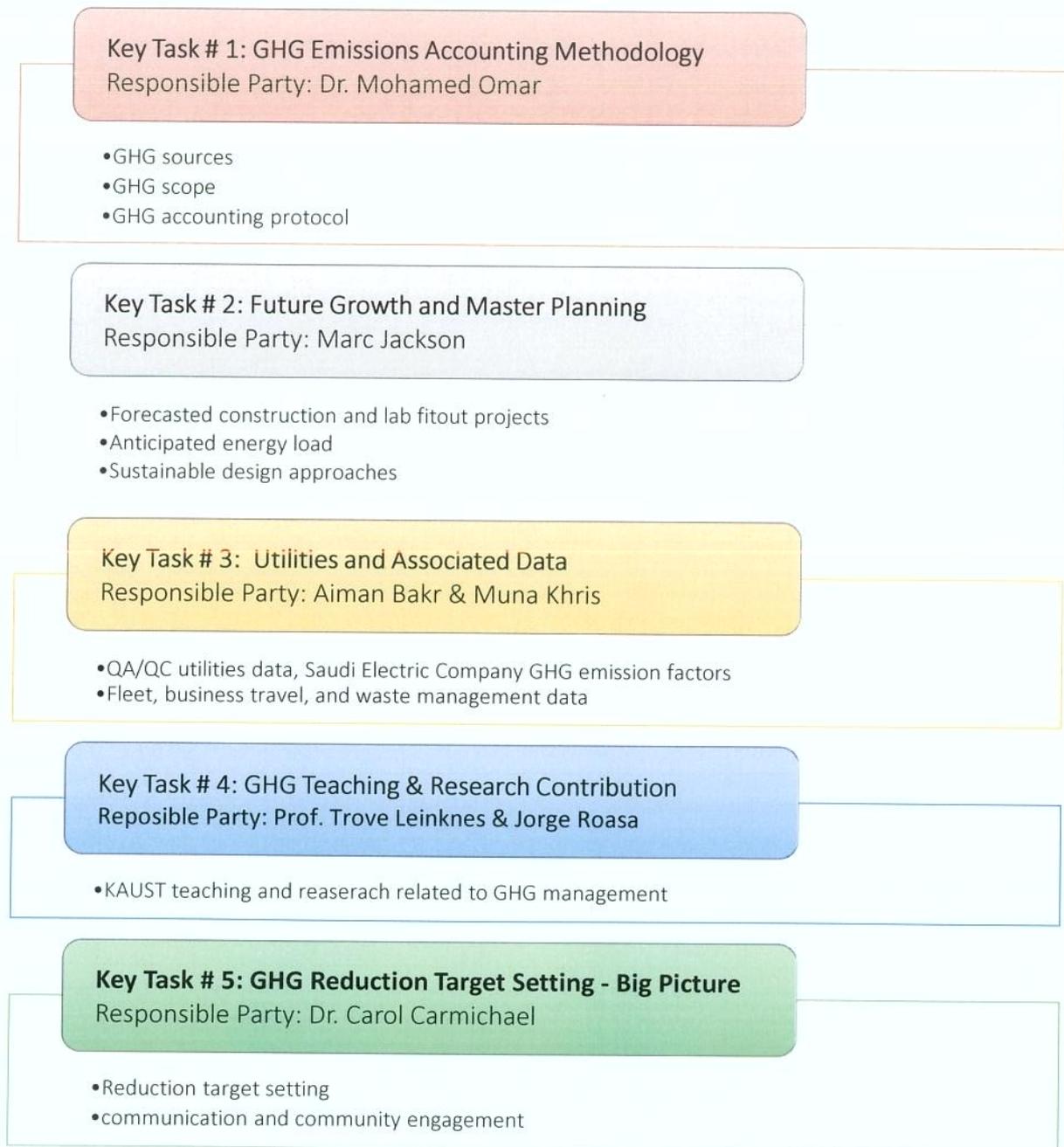
In an attempt to structure the proceedings of the Sub – Committee, following “**Key Tasks**” Figure 2, have been identified initially with Sub – Committee members heading each “**Key Tasks**.” Dr. Mohamed Omar, Environmental Protection Manager would coordinate the work of the Sub – Committee. A kickoff meeting will be called for next week. The work of the Sub – Committee has to be finalized no later than February 28<sup>th</sup>, 2016.

I look forward to active engagement and contribution from all members of the Sub – Committee.

**Figure 1: Example of Typical GHG Emissions & Indicative Reduction Target**



**Figure 2: GHG Management Strategy Key Tasks**



## Selected list of University classes related to GHG management

- Environmental Sustainability
- Advanced Topic in EnSE
- Combustion
- Biofuels and Clean Fossil Fuels
- Structure and Function of Marine Ecosystems
- Marine Microbiology
- Heat and Mass transfer
- Fluid Mechanics
- Computational Fluid Dynamics

## Selected list of research projects related to GHG management

- Studying Red Sea Phytoplankton, Fisheries, and Climate Change using Marine Remote Sensing Data (<https://rsrc.kaust.edu.sa/Pages/Studying-Red-Sea-Phytoplankton,-Fisheries,-and-Climate-Change-using-Marine-Remote-Sensing-Data.aspx>)
- Homogeneous Charge Compression Ignition (HCCI) Engines Research (<https://ccrc.kaust.edu.sa/Pages/HCCI.aspx>)
- Plasma assisted combustion (<https://ccrc.kaust.edu.sa/Pages/New-Combustion-Technology-researchpage.aspx>)
- Advanced Engine Research and FUELCOM (<https://ccrc.kaust.edu.sa/Pages/Advanced%20Engine%20Research%20and%20FUELCOM.aspx>)
- Emissions Formation and Reduction (<https://ccrc.kaust.edu.sa/Pages/Emissions%20Formation%20and%20Reduction%20research%20page.aspx>)
- Reduced methods for chemical kinetics (<https://ccrc.kaust.edu.sa/Pages/Reduced-methods-for-chemical-kinetics.aspx>)
- Particulate formation in reacting flows (<https://ccrc.kaust.edu.sa/Pages/Particulate-formation-in-reacting-flows.aspx>)
- Turbulent Mixing (<https://ccrc.kaust.edu.sa/Pages/Turbulent-Mixing.aspx>)
- Metal-Organic Framework ([https://ampm.kaust.edu.sa/Pages/Metal-Organic\\_Framework.aspx](https://ampm.kaust.edu.sa/Pages/Metal-Organic_Framework.aspx))

## APPENDIX 3 — List of Stakeholder Engaged and Data Provided

<b>Data</b>	<b>Data Source</b>
Purchased Electricity	Utilities Department – F&C
Fleet Fuel Usage	Retail & Logistics Services – F&C
Emergency Generator Fuel Usage	Utilities Department – F&C
Contractor’s Camp and Fleet	Contractor Project Managers - F&C
Refrigerant Usage	Maintenance Services & Utilities – F&C
Laundry Boiler Fuel Usage	Retail & Logistics Services – F&C
Waste Management	Waste Management Services – F&C
Construction Projects	Engineering & Projects Management

# APPENDIX 4 – Draft KAUST GHG Emissions

## University Greenhouse Gases Emissions (MTCDE) – BUSINESS AS USUAL

Year	Purchased Electricity	Onsite Stationary Combustion (Generator+Boiler)	Onsite Transportation	Refrigerant Leakages	Waste Disposal	Contractor Fleet	MTCO2E	Remarks
2015	365,687	995	3,301	33,737	3,344	6,990	414,054	Estimated based on actual operations data
2016	417,631	995	3,882	28,111	3,511	6,990	461,119	Estimated based on operations and new projects data
2017	463,526	995	4,161	8,754	3,631	6,990	488,057	Estimated based on operations and new projects data
2018	644,312	995	4,349	8,754	3,994	6,990	669,394	Estimated based on operations and new projects data
2019	645,783	995	4,547	8,754	4,194	6,990	671,263	Estimated based on operations and new projects data
2020	688,355	995	4,755	8,754	4,194	6,990	714,043	Estimated based on operations and new projects data
2025	826,026	1,194	5,706	10,505	5,033	8,388	856,851	2021-2025 Estimated based on population growth

## University Greenhouse Gases Emissions (MTCDE) – TARGET

Year	Purchased Electricity	Onsite Stationary Combustion (Generator+Boiler)	Onsite Transportation	Refrigerant Leakages	Waste Disposal	Contractor Fleet	MTCO2E	Remarks
2015	365,687	995	3,301	33,737	3,344	6,990	414,054	Estimated based on actual operations data
2016	417,631	995	3,882	28,111	3,511	6,990	461,119	Estimated based on operations and new projects data
2017	463,526	995	4,161	8,754	3,631	6,990	488,057	Estimated based on operations and new projects data
2018	644,312	995	4,349	8,754	3,994	6,990	669,394	Estimated based on operations and new projects data
2019	645,783	995	4,547	8,754	4,194	6,990	671,263	Estimated based on operations and new projects data
2020	688,355	995	4,755	8,754	4,194	6,990	714,043	Estimated based on operations and new projects data
2025	622,100	1,194	5,706	10,505	5,033	8,388	642,638	2021-2025 Estimated based on population growth



ENGINEERING & PROJECTS MANGEMENT

# KAUST Utility Constraints Study

ENGINEERING TEAM  
E&PM

Sunday, January 17, 2016

King Abdullah University of Science and Technology  
Thuwal, 23955-6900 Kingdom of Saudi Arabia

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January 24, 2016

**ANTONIO VALENZUELA**, Vice President  
Facilities and Community  
CSAB, Level 3, Rm. 329

**Final Report of KAUST Utility Constraints Master Plan Study**

Dear Tony,

Reference to our meeting dated on January 17, 2016 regarding KAUST Utility Constraints Master Plan Study, please find attached the final report of the KAUST utility constraints study that have been developed by E&PM and concurred by the stakeholders organizations. This study need to be updated and revised on continuous basis, therefore for any upcoming new future projects (not listed in this study), the requesting organization shall provide E&PM information related to their project & its utilities on the form UCD-F-038-2016(attached) after which E&PM shall analyze & recommend accordingly if there are any constraints on integrating the new projects with the existing utility networks.

E&PM would like to thank you as well as your team members for your support and collaborations which add great values to prepare and complete this study.

Should you need further information, you may contact the Engineering Head, Mohammad Balamash at 8082355 or via e-mail [mohammed.balamash@kaust.edu.sa](mailto:mohammed.balamash@kaust.edu.sa).



**MARC JACKSON**, Director  
Engineering & Project Management

Cc: E&PM Leadership Group  
Serry Bakarman, Director, R&TP

