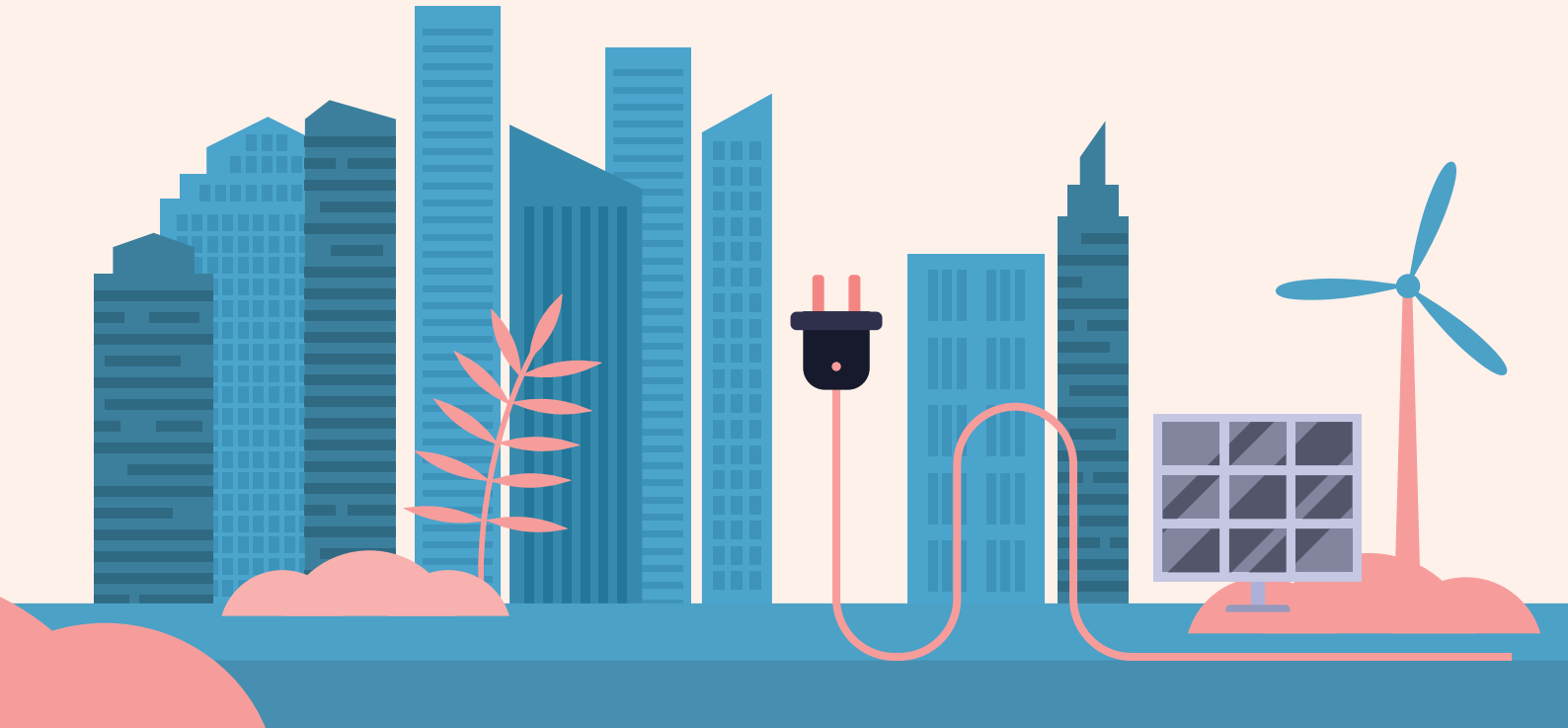
JOINT ACTION PLAN FOR THE HYBES PROJECT

Interreg
Co-funded by the European Union
Northern Periphery and Arctic



Content

ABBREVIATIONS

.Yπ .ƻŘDž ϥdzƳƳdzyŜ όbƻ₩ǿ I·èύ

/// ς /ƻ₩ϥ /ƻdzƴűè /ƻdzƴǑλf όL₩Ŝfl·yŘύ

b/9 ς b/9 Lƴădzfl·űλƻƴ όL₩Ŝfl·yŘύ

bwL π bƻ₩Řfl·yŘ wŜăŜI·₩ǑK Lƴăűλűdzűŝ όbƻ₩ǿ I·èύ

h{ ς bI·űλƻyI·f 9ƴŜ₩∃è !dzűKƻ₩λűè όLǑŜfl·yŘύ

¦// ς ¦yλǾŜ₩ăλűè /ƻffŜ∃Ŝ /ƻ₩ϥ όL₩Ŝfl·yŘύ

¦YŜň ς /λűè ƻŦ ¦YŜň ό{ǿŜŘŜyύ

¦Y¦ ς ¦YŜň ¦yλǾŜ₩ăλűè ό{ǿŜŘŜyύ

¦{ ς 9yǾλ₩ƻyƳŜyű !∃ŜyǑè όCI·₩ƻŜ Lăfl·yŘăύ

1 Introduction

l ¸ . NλŘ 9yŜN∃è {2ftdzűλ2yã ŦƵN ōdzλtŘλy∃ă l·yŘ λyŦNl·ăűNdzŎűdzNŜ ó l ¸ . 9{ú λă l· 9dzN2LJŜl·y˝LJN2ƶŜŎű Ŏ2π ŦdzyŘŜŘ dzyŘŜN úKŜ Lb¢9ww9D b2NúKŜNy˝tŜNλLJKŜNè l·yŘ !NŎűλŎ LJN2∃NJl·Y˝Y˝Sƶ l·yŘ λyŎftdzŘŜă LJl·NűyŜNă ŦN2Y˝ ŦλØŜ Ŏ2dzyűNλŜăY

- **Norway:** b2NŘfl·yŘ wŜăŜl·NŎK Lyãűλűdzű$ óbwLú ó**Lead Partner**úT . 2ŘDŽ YdzY˝Y˝dzyŜ ó . Yú
- **Ireland:** /2N] /2dzyűè /2dzyŎλf ó/ / /úT b/9 Lyãdzfl·űλ2y˝ób/9úT ¦yλØŜNăλúè /2ffŜ∃Ŝ /2N] ó¦ / /ú
- **Sweden:** /λűè 2Ŧ ¦Y˝Ŝň ó¦Y˝Ŝň úT ¦Y˝Ŝň ¦yλØŜNăλúè ó¦Y˝¦ú
- **Iceland:** bl·űλ2yl·f 9yŜN∃è !dzűK2NλúèóhÚ
- **Faroe Islands:** 9yØλN2yY˝Ŝyű !∃ŜyŎè ó¦{ú

l ¸ . 9{ Ŧ2ŎdzăŜă 2y˝űKŜ l·NŜl· 2Ŧ ŘŜŎl·N̄ō2yλăl·űλ2y˝l·yŘ ǿλff dzűλfλăŜ űKŜ Ijdzl·ŘNdzLJfŜ KŜfλÈ l·LJLJN2l·ŎK ű2 ŎNŜl·ûŜ ƨ2λyűfè ŘŜØŜf2LJŜŘ ˥y˝2ǿfŜŘ∃Ŝπōl·ăŜŘ ű22fă l·yŘ l·ŎűλØλűλŜă Ŧ2N LJN2Y˝2ûλy∃ λY˝LJN2ØŜŘ ŜyŜN∃è ŜŦŦλŎλŜyű ă2fdzűλ2yã ű2 l·ŎKλŜØŜ ădzōăűl·yűλl·f NŜŘdzŎűλ2y˝2Ŧ ∃NŜŜyK2dzăŜ ∃l·ă ŜY˝λăăλ2yã ǿλűKλy˝űKŜ bt ! NŜ∃λ2y¢ ¢Kλă ǿλff ōŜ l·ŎKλŜØŜŘ ōè λY˝LJfŜY˝Syűλy∃ űKŜ Ψ[λØλy∃ [l·ōăΩ Y˝2ŘŜf λy˝Ŏ2Y˝ōλyl·ûλ2y˝ǿλűK űKŜ Ŝăűl·ōfλăKY˝Syű 2Ŧ ŘŜŘλŎl·ûŜŘ 5ŜŎl·Nō2yλăl·ûλ2y˝½2yŜă ó5½ăú λy˝NdzNJl·f l·yŘ LJŜNλLJKŜNJl·f l·NŜl·ă λy˝űKŜ bt ! NŜ∃λ2y¢ ¢KŜ LJN2ƶŜŎű ǿλff ōdzλtŘ ŎλűλÎSy˝Ŏl·LJl·Ŏλűè l·yŘ l·λY˝ û2 Ŧl·ŎλfλűJl·ûŜ l·yŘ ŜØ2ĵŜ ōŜKl·Øλ2dzNJl·f ŎKl·y∃Ŝ û2 l·ăăλăű λy˝l·ŎKλŜØλy∃ ŎfλY˝l·ûŜ l·Ŏűλ2y˝2ō?ŜŎűλØŜă l·yŘ ű l·N∃Ŝűă λy˝ûKŜ l ¸ . 9{ LJl·NűyŜN NŜ∃λ2yã¢

Deliverable 1.1.1Σ ŜyűλűftŜŘ **Joint Action Plan for the HYBES project**Σ LJN2ØλŘŜă l·y˝2ØŜNØλŜǿ 2Ŧ ûKŜ yl·ûλ2yl·fΣ NŜ∃λ2yl·fΣ l·yŘ f2Ŏl·f LJ2fλŎλŜăΣ LJfl·yã l·yŘ fŜ∃λăfl·ûλ2y˝λy˝LJfl·ŎŜ λy˝Sl·ŎK 2Ŧ ûKŜ l ¸ . 9{ LJl·NűyŜN NŜ∃λ2yã óLNŜfl·yŘΣ bN ǿl·èΣ {ǿŠŘŜyΣ LŎŜfl·yŘ l·yŘ ûKŜ Cl·N2Ŝ Lăfl·yŘăúΣ ŎNŜl·ûλy∃ l·N2l·ŘY˝l·LJ û2 Y˝l·ÈλY˝λăŜ ûKŜ LJ2ûŜyűλl·f 2Ŧ ûKŜ Ijdzl·ŘNdzLJfŜ KŜfλÈ l·Ŏű2Nă λy˝Ŧl·Ŏλfλűl·ûλy∃ ŘŜŎl·N̄ō2yλăl·ûλ2y˝l·ŎN2ăă ûKŜ bt ! NŜ∃λ2y¢ ¢KŜ ŘŜfλØŜNJl·ōfŜ ûKŜy˝2dzûfλySă l· W2λyű !Ŏűλ2y˝tfl·y˝ ów! tú Ŧ2N ûKŜ l ¸ . 9{ LJN2ƶŜŎűΣ Ŏ2yãλŘŜNλy∃ ûKŜ l·fλ∃yY˝Syű 2Ŧ ûKŜ LJN2ƶŜŎű ǿλűK ûKŜ l·Ŧ2NŜY˝Syűλ2yŜŘ LJ2fλŎè N2l·ŘY˝l·LJΣ l·yŘ LJN2ØλŘŜă l·y˝2ØŜNØλŜǿ 2Ŧ ûKŜ ĵŜè LJN2ƶŜŎű 2ō?ŜŎűλØŜă l·yŘ ădzōπ2ō?ŜŎűλØŜăΣ l·yŘ ûKŜ l·ŎűλØλűλŜă ûKl·ű l·NŜ ōŜλy∃ dzyŘŜNűl·ĵŜy˝ōè ûKŜ LJN2ƶŜŎű û2 ŘŜfλØŜN ûKŜăŜ 2ō?ŜŎűλØŜă¢ ¢Kλă ǿλff l·fă2 l·ăăλ∃y˝NŜăLJ2yãλōfλűλŜă Ŧ2N ŘŜfλØŜNλy∃ ûKŜăŜ l·Ŏűλ2yã¢

5ŜfλØŜNl·ōfŜ мφмφм ǿλff ōŜ l· ĵŜè λyLJdzű λyű2 ûKŜ NŜY˝l·λyλy∃ l·ŎűλØλűλŜă 2Ŧ ûKŜ l ¸ . 9{ LJN2ƶŜŎű l·yŘ ǿλff ōŜ NŜØλŜǿŜŘ l·ă LJl·Nű 2Ŧ **1.8.1 Capitalisation Plan for the HYBES project,** ǿKŜNŜ ûKŜ ădzŎŎŜăă 2Ŧ ûKŜ LJN2ƶŜŎű ǿλff ōŜ l·ăăŜăăŜŘΣ l·ă ǿŜff l·ă 2LJLJ2NűdzyλűλŜă Ŧ2N Ŏl·LJλűl·fλăl·ûλ2y˝2y˝LJN2ƶŜŎű l·Ŏűλ2yã LJ2ăűπLJN2ƶŜŎű l·yŘ LJ2ăăλōfŜ NŜLJfλŎl·ûλ2y˝2LJLJ2NűdzyλűλŜă¢

2 Pathways to Decarbonisation in the Northern Periphery and Arctic (NPA) Region

2.1 Introduction

[illegible][1]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible][2]

[illegible][3]

[illegible]

1 European Commission (2019) A European Green Deal. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

2 European Commission (2019) A European Green Deal.

3 United Nations (2016) The Paris Agreement. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement

ŦƧℕŐŜ ƨƴűKŜ нфᵘᴷ ²Ŧ Wdzfȅ нлнмΣ l·yŘ Ŝăűl·ōfλăKŜă l· fŜƎl·ffȅ ōλyŘλyƎ ŦℕI·Y Ŝø2ℕ] Ŧ2ℕ űKŜ ŘŜfØŜℕȅ 2Ŧ űKŜ Ǝ2l·fă l·yŘ 2ō?ŜŐűØŜă 2Ŧ űKŜ 9dzℕ2LJŜI·ƴDℕŜŜƴ5Ŝl·f⁴Φ ¢KŜ /fΛY l·ûŜ [l·ø λyŐfdzŘŜăƳ

- l· fŜƎl·f ƨō?ŜŐűØŜ Ŧ2ℕ űKŜ ¦ yλ2ƴű2 ℕŜI·ŐK ŐfΛY l·ûŜ ySdzűℕl·fűȅ ōè нлрл
- l·ƴ l·Y ōλűΛ2dză нлол ŐfΛY l·ûŜ ûl·ℕƎŜű 2Ŧ l·ú fŜl·ăű pp̰̂ ℕŜŘdzŐűλ2ƴ2Ŧ ySű ŜYλăăλ2yã 2Ŧ ƎℕŜŜyƘ2dzăŜ Ǝl·ăŜă l·ă Ő2YLJI·ℕŜŘ ű2 мффлΣ øλűK Őfl·ℕΛűȅ ƨyűKŜ Ő2yűℕΛōdzűΛ2ƴ2Ŧ ŜYλăăλ2ƴ ℕŜŘdzŐűλ2yã l·yŘ ℕŜY2Øl·fă
- ℕŜŐƨƎyΛűλ2ƴ2Ŧ űKŜ ySŜŘ ű2 ŜyƘl·yŐŜ űKŜ 9¦ąă Ől·ℕō2ƴăλyℾ űKℕ2dzƎK l· Y2ℕŜ l·Yōλűλ2dză [¦[¦/C ℕŜƎdzfl·ûλ2yΣ Ŧ2ℕ øKλŐK űKŜ /ƨYYλăăλ2ƴYl·ŘŜ l· LJℕ2LJƨăl·f λyWdzfȅ нлнм
- l· LJℕ2ŐŜăă Ŧ2ℕ ăŜűűλyƎ l· нлпл ŐfΛY l·ûŜ ûl·ℕƎŜűΣ úl·ℾλyƎ λyűƨ l·ŐŐ2dzyű l·ƴλyŘλŐl·űλØŜ ƎℕŜŜyƘ2dzăŜ Ǝl·ă ōdzŘƎŜű Ŧ2ℕ нлолπнлрл ű2 ōŜ LJdzōfλăKŜŘ ōè űKŜ /ƨYYλăăλ2ƴ
- l· Ő2YYλűYŜyű ű2 yŜƎl·ûλØŜ ŜYλăăλ2yã l·ŦűŜℕ нлрл
- ûKŜ Ŝăűl·ōfλăKYŜyű 2Ŧ 9dzℕ2LJŜI·ƴ{ŐλŜyűλŦλŐ !ŘØλă2ℕȅ .2l·ℕŘ 2ƴ /fΛY l·ûŜ /Kl·yƎŜΣ ûKl·ű øλtf LJℕ2ØλŘŜ λyŘŜLJŜyŘŜyű ăŐλŜyűλŦλŐ l·ŘØλŐŜ
- ăűℕ2yƎŜℕ LJℕ2Øλăλ2yã 2ƴ l·Řl·LJűl·ûλ2ƴű2 ŐfΛY l·ûŜ ŐKl·yƎŜ
- ăűℕ2yƎ Ő2ƘŜℕŜyŐŜ l·ŐℕΛ2ăă ¦ yλ2ƴLJ2fλŐλŜă øλűK ûKŜ ŐfΛY l·ûŜ ySdzűℕl·fűȅ 2ō?ŜŐűØŜ
- l· Ő2YYλűYŜyű ű2 ŜyƎl·ƎŜ øλűK ăŜŐű2ℕă ű2 LJℕŜLJl·ℕŜ ăŜŐű2ℕπăLJŜŐλŦλŐ ℕ2l·ŘYl·LJă ŐKl·ℕűλyƎ ûKŜ LJl·ûK ű2 ŐfΛY l·ûŜ ySdzűℕl·fűȅ λƴŘλŦŦŜℕŜyű l·ℕŜl·ă 2Ŧ űKŜ ŜŐ2y2Yè

!ă LJl·ℕű 2Ŧ űKŜ Ő2YYλűYŜyűă Yl·ŘŜ ű2 ûKŜ tl·ℕλă !ƎℕŜŜYŜyű l·yŘ ûKŜ 9dzℕ2LJŜI·ƴDℕŜŜƴ5Ŝl·fΣ 9¦ aŜYōŜℕ {űl·ûŜă l·ℕŜ ℕŜljdzλℕŜŘ ű2 ŘŜØŜf2LJ yl·ûλ2yl·f f2yƎπűŜℕY ăűℕl·ûŜƎλŜă 2ƴK2ø ûKŜè LJfl·ƴű2 l·ŐKλŜØŜ ûKŜ ƎℕŜŜyƘ2dzăŜ Ǝl·ă ŜYλăăλ2yã ℕŜŘdzŐűλ2yã ySŜŘŜŘ ű2 YŜŜű ûKŜλℕ Ő2YYλűYŜyűă dzyŘŜℕ ûKŜ l·Ŧ2ℕŜYŜyűλ2ySŘ LJ2fλŐλŜă l·yŘ fŜƎλăfl·ûλ2yΦ

¢Kλă ăŜŐűλ2ƴ2Ŧ ûKŜ ŘŜfØŜℕl·ōfŜΣ ŜyűλűfŜŘ **Pathways to Decarbonisation in the Northern Periphery and Arctic (NPA) Region,** Ő2yãλŘŜℕă ûKŜ yl·ûλ2yl·fΣ ℕŜƎλ2yl·fΣ l·yŘ f2Ől·f LJ2fλŐλŜăΣ LJfl·yã l·yŘ fŜƎλăfl·ûλ2ƴλyLJfl·ŐŜ λyƴŜl·ŐK 2Ŧ ûKŜ l ¸.9{ LJl·ℕűyŜℕ ℕŜƎλ2yã óLℕŜfl·yŘΣ b2ℕøl·èΣ {øŜŘŜyΣ LŐŜfl·yŘ l·yŘ ûKŜ Cl·ℕ2Ŝ LăfλyŘăú λyƴℕŜfl·ûλ2ƴű2 ŐfΛY l·ûŜ l·Őûλ2ƴl·yŘ ŘŜŐl·ℕō2yλăl·ûλ2yΦ ¢Kλă LJ2fλŐè ℕ2l·ŘYl·LJ øλtf ōŜ dzăŜŘ ű2 λyŦ2ℕY ûKŜ ŘŜØŜf2LJYŜyű 2Ŧ ûKŜ W2λyű !Őűλ2ƴ tfl·ƴŦ2ℕ ûKŜ l ¸.9{ LJℕ2?ŜŐűΣ l·ă øŜft l·ă ûKŜ Ŧdzűdzℕ$ LJℕ2?ŜŐű /l·LJλűl·fλăl·ûλ2ƴ tfl·yΦ

2.2 Cork County, Ireland

2.2.1 Introduction

/fΛY l·ûŜ l·Őűλ2ƴl·yŘ ŘŜŐl·ℕō2yλăl·ûλ2ƴLJ2fλŐè λƴLℕŜfl·yŘ λă dzyŘŜℕLJλyŶŜŘ ōè l· yƊzYōŜℕ 2Ŧ yl·ûλ2yl·f LJ2fλŐλŜăΣ LJfl·yã l·yŘ fŜƎλăfl·ûλ2ƴλyLJfl·ŐŜ λyƴŜl·ŐK l·ℕŜ ℕŜl·fλăŜŘ l·yŘ λYLJfŜYŜyűŜŘ l·ű ō2űK l· ℕŜƎλ2yl·f l·yŘ f2Ől·f fŜØŜfΦ ¢KŜℕŜ Kl·ă ōŜŜƴl· ădzōăűl·yűλl·f ăKλŦű λyƴyl·ûλ2yl·f LJ2fλŐè λyƴℕŜŐŜyű èŜl·ℕă l·Őℕ2ăă ûKŜ {űl·ûŜΣ øλűK ŐfΛY l·ûŜ l·Őûλ2ƴ2ŐŐdzLJèλyƎ l· ŐŜyűℕl·f l·yŘ ŦdzyŘl·YŜyűl·f ℕ2fŜ λyƴLJ2fλŐè Ŧ2ℕYdzfl·ûλ2ƴ l·yŘ ŘŜŐλăλ2yπYl·ℾλyƎ l·Őℕ2ăă l·ff fŜØŜfă 2Ŧ yl·ûλ2yl·fΣ ℕŜƎλ2yl·fΣ l·yŘ f2Ől·f Ǝ2ØŜℕyYŜyű λyƴLℕŜfl·yŘΦ {2YŜ 2Ŧ ûKŜ ℾŜè LJ2fλŐλŜă l·yŘ LJfl·yã λyŦdzŜyŐλyƎ ŐfΛY l·ûŜ l·Őûλ2ƴ l·yŘ ŘŜŐl·ℕō2yλăl·ûλ2ƴλyƴō2ûK LℕŜfl·yŘΣ l·yŘ l·ű l· f2Ől·f fŜØŜf λyƴ/2ℕ] /2dzyűèΣ Kl·ØŜ ŐŜŜyƴōℕλŜŦfȅ ℕŜŦŜℕŜyŐŜŘ l·yŘ 2dzűfλyŜŘ ōŜf2øΦ

4 European Commission (2021) European Climate Law. Available at: https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en

2.2.2 National Policies, Plans and Legislation

2.2.2.1 The Climate Action and Low Carbon Development (Amendment) Act 2021[5]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

2.2.2.2 Climate Action Plan 2023 (CAP23): Changing Ireland for the Better[6]

[illegible] *Climate Action and Low Carbon Development (Amendment) Act 2021* [illegible]

[illegible]

---

5 Government of Ireland (2021) The Climate Action and Low Carbon Development (Amendment) Act 2021. Available at: https://www.irishstatutebook.ie/eli/2021/act/32/enacted/en/print

6 Government of Ireland (2022) Climate Action Plan 2023 (CAP23): Changing Ireland for the Better. Department of the Environment, Climate and Communications. Available at: https://assets.gov.ie/243585/9942d689-2490-4ccf-9dc8-f50166bab0e7.pdf

7 Government of Ireland (2019) Climate Action Plan 2019: To Tackle Climate Breakdown. Department of the Environment, Climate and Communications. Available at: https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf

[illegible]

[illegible]

2.2.2.3 Project Ireland 2040: National Planning Framework9

[illegible]

[illegible]

[illegible]

8 Government of Ireland (2022) Climate Action Plan 2023 (CAP23): Changing Ireland for the Better. Department of the Environment, Climate and Communications. Available at: https://assets.gov.ie/243585/9942d689-2490-4ccf-9dc8-f50166bab0e7.pdf , p. 91.

9 Government of Ireland (2020) Project Ireland 2040: National Planning Framework. Department of Housing, Planning and Local Government. Available at: https://assets.gov.ie/246231/39baaa8c-48dc-4f24-83bd-84bbcf8ff328.pdf

10 Government of Ireland (2020) Project Ireland 2040: National Planning Framework. Department of Housing, Planning and Local Government, p. 15.

11 Government of Ireland (2020) Project Ireland 2040: National Planning Framework. Department of Housing, Planning and Local Government, p. 166.

- bthpoς {dzLJLJ2ℕú ŭKŜ ŎλℕŎdzfIꞏℕ IꞏyŘ ōλ2ŜŎ2y2Yè λyŎfdzŘλyƎ ŭKℕ2dzƎK ƎℕŜIꞏúŜℕ ŜŦŦλŎλŜyŎè λyˇfIꞏyŘ YIꞏyIꞏƎŜYˇŜyúΣ ƎℕŜIꞏúŜℕ dzăŜ 2Ŧ ℕŜySǿIꞏōfŜ ℕŜăƨdzℕÔŜă IꞏyŘ ōè ℕŜŘdzŎλyƎ ŭKŜ ℕIꞏúŜ 2Ŧ fIꞏyŘ dzăŜ ŎKIꞏyƎŜ ŦℕƨYˇ dzℕōIꞏyˇăLJℕIꞏǿf IꞏyŘ ySǿ ŘŜØŜfƨLJYˇŜyúΦ
- bthpπς wŜŘdzŎŜ 2dzℕ ŎIꞏℕō2yˇŦ22úLJℕλyú ōè λyúŜƎℕIꞏúλyƎ ŎfλYIꞏúŜ IꞏŎúλ2yˇλyú2 úKŜ LJfIꞏyɣλyƎ ăèăúŜYˇ λyˇădzLJLJ2ℕú 2Ŧ yIꞏúλ2yIꞏf úIꞏℕƎŜúă Ŧ2ℕ ŎfλYIꞏúŜ LJ2fλŎè YˇλúλƎIꞏúλ2yˇIꞏyŘ IꞏŘIꞏLJúIꞏúλ2yˇ2ō2ŜŎúλØŜăΣ Iꞏă ǿŜft Iꞏă úIꞏℕƎŜúă Ŧ2ℕ D I D ŜYˇλăăλ2yã ℕŜŘdzŎúλ2yãΦ
- bthppς tℕ2Yˇ2úŜ ℕŜySǿIꞏōfŜ ŜySℕƎè dzăŜ IꞏyŘ ƎŜySℕIꞏúλ2yˇIꞏú IꞏLJLJℕ2LJℕλIꞏúŜ f2ŎIꞏúλ2yã ǿλúKλyˇúKŜ ōdzλfú IꞏyŘ yIꞏúdzℕIꞏf ŜyØλℕ2yYˇŜyú úƨ2 YˇŜŜú yIꞏúλ2yIꞏf ƨō2ŜŎúλØŜă úƨ2ǿIꞏℕŘă IꞏŎKλŜØλyƎ Iꞏ fƨǿ ŎIꞏℕō2yˇ ŜŎ2y2Yˇè ōè нлрлΦ
- bthpcς {dzăúIꞏλyIꞏōfè YIꞏyIꞏƎŜ ǿIꞏăúŜ ƎŜySℕIꞏúλ2yΣ λyØŜăúλyƎ λyˇŘλŦŦŜℕŜyú úèLJŜă 2Ŧ ǿIꞏăúŜ úℕŜIꞏúYˇŜyú IꞏyŘ ădzLJLJ2ℕú ŎλℕŎdzfIꞏℕ ŜŎ2y2Yˇè LJℕλyŎλLJfŜăΣ LJℕλ2ℕλúλăλyƎ LJℕŜØŜyúλ2yΣ ℕŜdzăŜΣ ℕŜŎèŎfλyƎ IꞏyŘ ℕŜŎƨØŜℕèΣ úƨ ădzLJLJ2ℕú Iꞏ KŜIꞏfúKè ŜyØλℕ2yYˇŜyúΣ ŜŎ2y2Yˇè IꞏyŘ ă2ŎλŜúèΦ

¢KŜ Ǝ2Iꞏfă IꞏyŘ ƨō2ŜŎúλØŜă 2Ŧ úKŜ btC IꞏℕŜ ădzLJLJ2ℕúŜŘ ōè úKŜ bIꞏúλ2yIꞏf 5ŜØŜfƨLJYˇŜyú tfIꞏyˇнлнм π нлол ób5tύΣ ǿKλŎK ăŜúă 2dzú úKŜ λyØŜăúYˇŜyú LJλ2ℕλúλŜă úKIꞏú ǿλffdzyŘŜℕLJλyˇúKŜ λYˇLJfŜYˇŜyúIꞏúλ2yˇ2Ŧ úKŜ btC úKℕ2dzƎK Iꞏ ûƨúIꞏfλyØŜăúYˇŜyú 2Ŧ IꞏLJLJℕ2ÈλYIꞏúŜfè ємср ōλffλ2yΦ ¢KŜ b5t KIꞏă ōŜŜyŘŜăλƎySŘ ûƨ ŜyãdzℕŜ úKIꞏú λŭ ădzLJLJ2ℕúă úKŜ LℕλăK D2ØŜℕyYˇŜyúΩă ŎfλYIꞏûŜ IꞏYˇōλúλ2yãΦ

2.2.3 Regional Policies, Plans and Legislation

2.2.3.1 Regional Spatial & Economic Strategy: for the Southern Region (RSES)[12]

¢KŜ wŜƎλ2yIꞏf {LJIꞏúλIꞏf ɜ 9Ŏ2y2YˇλŎ {úℕIꞏúŜƎè Ŧ2ℕ úKŜ {2dzúKŜℕyˇwŜƎλ2yˇów{9{ú ăŜúă 2dzú úKŜ ăúℕIꞏúŜƎλŎ ℕŜƎλ2yIꞏf ŘŜØŜfƨLJYˇŜyú ŦℕIꞏYˇŜǿ2ℕ] Ŧ2ℕ úKŜ {2dzúKŜℕyˇwŜƎλ2yΣ ǿλúK Iꞏ LJℕλYIꞏℕè IꞏλYˇ úƨ λYˇLJfŜYˇŜyú tℕ2ƨŜŎú LℕŜfIꞏyŘ нлпл π úKŜ bIꞏúλ2yIꞏf tfIꞏyɣλyƎ CℕIꞏYˇŜǿ2ℕ]Σ Iꞏú Iꞏ ℕŜƎλ2yIꞏf fŜØŜf IꞏyŘ úƨ ădzLJLJ2ℕú Iꞏ ōIꞏfIꞏyŎŜŘ IꞏyŘ ŜIjdzλúIꞏōfŜ ℕŜƎλ2yIꞏf ƎℕǿǿúK LJfIꞏyΦ ! ă ădzŎKΣ úKŜ w{9{ λă ℕŜIjdzλℕŜŘ úƨ ōŜ ŘλℕŜŎúfè λyˇfλyŜ IꞏyŘ λyˇŎ2YˇLJfλIꞏyŎŜ ǿλúK úKŜ Ǝ2Iꞏfă IꞏyŘ ƨō2ŜŎúλØŜă 2Ŧ úKŜ btCΣ λyŎfdzŘλyƎ úKŜ IꞏŎúλ2yã ℕŜfIꞏúŜŘ úƨ ŎfλYIꞏúŜ IꞏŎúλ2yˇIꞏyŘ úKŜ úℕIꞏyãλúλ2yˇúƨ Iꞏ fƨǿ ŎIꞏℕō2yˇIꞏyŘ ŎfλYIꞏúŜ ℕŜăλfλŜyú ă2ŎλŜúèΦ ¢KŜ w{9{ λŘŜyúλŦλŜă /2ℕ] /2dzyúè IꞏY2yƎăú úKŜ ŦIꞏăú ŜăúπƎℕ2ǿλyƎ f2ŎIꞏúλ2yã λyˇúKŜ {úIꞏúŜ 2ØŜℕ úKŜ ySÈú нл èŜIꞏℕăΣ IꞏyŘ KIꞏă IꞏyˇƨØŜℕIꞏff ØλăλƨyˇŦ2ℕ úKŜ {2dzúKŜℕyˇwŜƎλ2yˇλă úƨY

- !ŎKλŜØŜ ŜŎ2y2YˇλŎ LJℕ2ăLJŜℕλúè IꞏyŘ λYˇLJℕ2ØŜŘ IjdzIꞏfúè 2Ŧ fλŦŜ Ŧ2ℕ Iꞏff 2dzℕ ŎλúλÎŜyã
- !ÖŎ2YˇYˇ2ŘIꞏúŜ ŜÈLJIꞏyŘŜŘ ƎℕǿǿúK IꞏyŘ ŘŜØŜfƨLJYˇŜyú λyˇădzλúIꞏōfŜ fƨŎIꞏúλ2yãT IꞏyŘ
- aIꞏ]Ŝ úKŜ {2dzúKŜℕyˇwŜƎλ2yˇ2yŜ 2Ŧ 9dzℕ2LJŜΩă YˇƨăúŎℕŜIꞏúλØŜΣ λyɣƨØIꞏúλØŜΣ ƎℕŜŜySˇăú IꞏyŘ fλØŜIꞏōfŜ ℕŜƎλ2yã

¢KŜ w{9{ λŘŜyŭλŦλŜă úKŜ ySŜŘ úƨ úℕIꞏyãλúλ2yˇúƨ Iꞏ [2ǿ /IꞏℕōƨyΣ /fλYIꞏúŜ wŜăλfλŜyú IꞏyŘ {dzăúIꞏλyIꞏōfŜ {2ŎλŜúè Iꞏă]Sè ăúℕIꞏúŜƎλŎ LJℕλ2ℕλúè 2Ŧ úKŜ ℕŜƎλ2yIꞏf LJfIꞏyˇówt yúΣ IꞏyŘ úKŜ wŜƎλ2yIꞏf !ăăŜYˇōfè ǿλff ǿ2ℕ] λyˇ LJIꞏℕŭySℕăKλLJ ǿλúK úKŜ /fλYIꞏúŜ !ŎúλƨyˇwŜƎλ2yIꞏf hŦŦλŎŜă ó/ !whú úƨ ădzLJLJ2ℕú úKŜ ŘŜØŜfƨLJYˇŜyú 2Ŧ f2yƎπ úŜℕYˇ ă2fdzúλ2yã IꞏyŘ ŜÈúŜyãλØŜ IꞏŘIꞏLJúIꞏúλ2yˇYŜIꞏădzℕŜă λyˇúKℕŜŜ]Sè IꞏℕŜIꞏăY ŘŜŎIꞏℕō2yλăIꞏúλ2yΣ ŎfλYIꞏúŜ ℕŜăλfλŜyŎŜ IꞏyŘ ℕŜă2dzℕŎŜ ŜŦŦλŎλŜyŎèΦ

{ŜØŜℕIꞏf ăLJŜŎλŦλŎ wŜƎλ2yIꞏf t2fλŎè hō2ŜŎúλØŜă ówthăú ǿλúK IꞏŎŎ2YˇLJIꞏyèλyƎ IꞏŎúλ2yã IꞏℕŜ λŘŜyúλŦλŜŘ λyˇúKŜ LJfIꞏyˇλyˇℕŜfIꞏúλ2yˇúƨ ŎfλYIꞏúŜ IꞏŎúλ2yˇIꞏyŘ ŘŜŎIꞏℕō2yλăIꞏúλ2yΣ λyŎfdzŘλyƎY

- wthyτ π [2ǿ /Iꞏℕō2yˇ9yŜℕƎè CdzúdzℕŜ
- wthyy π bIꞏúλ2yIꞏf aλúλƎIꞏúλ2yˇtfIꞏyˇIꞏyŘ bIꞏúλ2yIꞏf !ŘIꞏLJúIꞏúλ2yˇCℕIꞏYˇŜǿ2ℕ]
- wthyφ π .dzλfŘλyƎ wŜăλfλŜyŎŜ úƨ /fλYIꞏúŜ /KIꞏyƎŜ
- wthφл π wŜƎλ2yIꞏf 5ŜŎIꞏℕō2yλăIꞏúλ2yˇ

12 Southern Regional Assembly (2020) Regional Spatial & Economic Strategy for the Southern Region. Available at: https://online.flippingbook.com/view/106862236/

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

2.2.4 Local Policies, Plans and Legislation

2.2.4.1 Cork County Development Plan 2022-2028[13]

[illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

13 Cork County Council (2022) Cork County Development Plan 2022-2028. Volume 1, Main Policy Material. Available at: https://www.corkcoco.ie/sites/default/files/2022-06/volume-1-main-policy-material.pdf , p. 24.

14 Cork County Council (2022) Cork County Development Plan 2022-2028. Volume 1, Main Policy Material. Available at: https://www.corkcoco.ie/sites/default/files/2022-06/volume-1-main-policy-material.pdf , p. 24.

- [illegible]
- [illegible]
- [illegible][15]

2.2.4.2 Cork County Council Climate Adaptation Strategy, 2019-2024[16]

[illegible]

[illegible][17]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

15 Cork County Council (2022) Cork County Development Plan 2022-2028. Volume 1, Main Policy Material. Available at: https://www.corkcoco.ie/sites/default/files/2022-06/volume-1-main-policy-material.pdf , p. 389.

16 Cork County Council (2019) Cork County Council Climate Adaptation Strategy, 2019-2024. Available at: https://www.corkcoco.ie/sites/default/files/2021-11/cork-county-council-climate-adaptation-strategy-2019-2024-pdf.pdf

17 Cork County Council (2019) Cork County Council Climate Adaptation Strategy, 2019-2024, p. 6.

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

2.2.4.3 Cork County Council Climate Action Plan, 2024-2028

[illegible] *The Climate Action and Low Carbon Development (Amendment) Act 2021.* [illegible][18] [illegible]

[illegible]

2.2.5 Conclusion

[illegible] *The Climate Action and Low Carbon Development (Amendment) Act 2021,* [illegible]

[illegible]

18 Government of Ireland (2023) Local Authority Climate Action Plan Guidelines. Department of the Environment, Climate and Communications. Available at: https://assets.gov.ie/250048/e508312c-39c4-4a78-a7ad-c855afc501e6.pdf

[illegible][19] [illegible][20] [illegible]

2.3 Norway

2.3.1 Introduction

[illegible]

2.3.2 National Policies, Plans and Legislation

2.3.2.1 The Climate Change Act 2021

[illegible][21] [illegible]

[illegible]

¢KÊffectt of Norway's participation in the EU Emissions Trading System (ETS) contributes essential when assessing progress towards this target. The agreement with the EU does not set national targets for ETS emissions in the same way as for non-ETS emissions. The installations covered by the EU Emissions Trading System (EU ETS) must collectively reduce their emissions to achieve the overall

19 Government of Ireland (2017) National Mitigation Plan. Department of Communications, Climate Action and Environment. Available at: https://assets.gov.ie/76378/cbc1452e-8738-4a70-a6e9-caec737e1abe.pdf

20 Government of Ireland (2018) National Adaptation Framework: Planning for a Climate Resilient Ireland. Department of Communications, Climate Action and Environment. Available at: https://assets.gov.ie/76430/d35c3843-29c7-419a-b48b-ad5db2bfb118.pdf

21 Act relating to Norway's climate targets (Climate Change Act). LOV-2021-06-18-129. https://lovdata.no/dokument/NLE/lov/2017-06-16-60

target. Climate action and decarbonization Transition to Net Zero and achieve a climate neutral economy by no later than 2050.

In its annual reporting to the Storting under the Climate Change Act, the Government will assess implementation of Norway's progress towards the 2030 target. In its budget proposal for the following year, the Government shall give an account of:

- how Norway can achieve the climate targets set out
- the expected effect of the proposed budget on greenhouse gas emissions.

Each year, the Government shall, based on scientific information, provide the Storting in a suitable manner with the following:

- an account of changes in emissions and removals of greenhouse gases, projections of emissions and removals, and progress towards the climate targets,
- an account of how Norway is preparing for and adapting to climate change,
- an overview showing sectoral emission trajectories for emissions that are not covered by the EU Emissions Trading System and the types of measures that will be necessary to achieve them,
- status report on Norway's carbon budget, considering relevant arrangements within the framework of joint fulfilment with the EU

2.3.2.2 Norway's Climate Action Plan for 2021–2030

Climate action plan 2021-2030[22] puts Norway on track to achieve its enhanced target of cutting greenhouse gas emissions by 50–55 % by 2030, and its long-term target of reducing them by 90–95 % by 2050. The plan includes measures and instruments for reducing both ETS (Emissions Trading System) and non-ETS emissions, and for increasing CO2 removals and reducing emissions from forest and other land categories. Specific measures and instruments to cut non-ETS emissions by 45 % form a key element of the plan. The Government's target is for Norway to reduce its non-ETS emissions by 45 % between 2005 and 2030. Converted into an emission budget, this corresponds to total emissions over the next ten years of no more than 201.8 million tonnes CO2eq. Under its climate agreement with the EU, Norway has an additional commitment to ensure that emissions from the land use, land use change and forestry (LULUCF) sector over the period 2021–2030 do not exceed removals. Preliminary calculations indicate that Norway's net emissions may be around 18 million tonnes CO2eq, if the managed forest land flexibility (often referred to as the compensation mechanism) that is part of the EU accounting rules is included. Today, climate-related taxes combined with emissions trading are proving effective in cutting greenhouse gas emissions across sectors. These two policy instruments apply to more than 80 % of greenhouse gas emissions in Norway.

Cross-sectoral instruments such as taxation of greenhouse gas emissions and emissions trading are the main instruments of Norwegian climate policy. These instruments put a price on emissions and give every household and company incentives to reduce emissions and to develop and deploy climate-friendly solutions.

Government intends to make stepwise increases in the taxation level for non-ETS greenhouse gas emissions, reaching NOK 2000 per tonne CO2eq in 2030.

22 Norway's Climate Action Plan for 2021–2030. Meld. St. 13 (2020 – 2021) Report to the Storting (white paper). https://www.regjeringen.no/contentassets/a78ecf5ad2344fa5ae4a394412ef8975/en-gb/pdfs/stm202020210013000engpdfs.pdf

The Government will make use of the purchasing power of the public sector to speed up the pace of development, for example by including climate-related requirements in public procurement processes in the transport sector. Norway is at the forefront in the use of electric vehicles. Various other regulatory measures have also been adopted, such as a prohibition on using mineral oil to heat buildings and biofuel quota obligations for both road transport and aviation.

Norway is already making good progress. Since the peak year 2015, annual greenhouse gas emissions from road traffic have declined from 10.1 million tonnes CO2eq to 8.5 million tonnes CO2eq in 2019.

Buildings where people live and work must be climate-friendly both in the construction phase and when they are in use. By re-using materials and buildings for new purposes, it is possible to reduce raw material and energy use and cut waste generation and greenhouse gas emissions. The central government administration owns large numbers of buildings all across the country and will provide a good example by seeking to achieve a common set of climate and environmental aims for public buildings. It will not be possible to achieve national and international climate targets without reducing greenhouse gas emissions from construction and buildings. In Norway, the sector accounts for roughly 40 % of energy consumption and a large proportion of resource use and waste generated.

The energy requirements in Norway's Technical Construction Regulations[23] have thus far dealt with energy efficiency and the use of renewable energy largely by requiring an energy-efficient building structure and the use of renewable energy supplies. It is important to reduce energy consumption as far as possible and reasonable in financial terms. Energy efficiency is still important in all sectors, and it often pays for individual people to improve their energy efficiency. Smart meters provide better information on electricity consumption and are important as a tool for facilitating other technological solutions, for example smart charging of electric cars. If energy now used in buildings is freed up, it could be used in other sectors to replace fossil energy and reduce the need for new electricity production and developments in undisturbed areas.

The aim is that in 2030, Norway will be a major producer of renewable energy. Norway has plentiful supplies of renewable energy resources, mainly in the form of flexible hydropower production. About 98 % of Norwegian electricity production is renewable. In addition, market design and the structure of the power grid ensure that the overall power system is used effectively. A flexible energy system can speed up electrification and result in lower costs for households and the business sector. Optimal use of grid capacity is an essential basis for the success of electrification. If the grid is not used effectively, there is a risk that it will be expanded more than necessary. This can result in environmental disturbance that could have been avoided and in higher tariffs than necessary for households and businesses.

Expanding production of renewable energy from offshore wind and solar power and making greater use of hydrogen and battery technology will offer opportunities for new commercial activities related to production, maintenance, control systems and other services.

The development of battery technology and battery production are vital for further electrification of the transport sector both in Norway and internationally. Hydrogen technology is another area where Norway has considerable potential. **The white paper on long-term value creation from Norwegian**

23 Regulations on technical requirements for construction works. An unofficial English translation of the regulation "Forskrift om tekniske krav til byggverk (Byggteknisk forskrift - TEK17)" for information purposes. Any disputes shall be decided on the basis of the formal regulation in Norwegian. https://dibk.no/globalassets/byggeregler/regulation-on-technical-requirements-for-construction-works--technical-regulations.pdf

energy resources[24] will include a roadmap for hydrogen technology. The Norwegian Public Roads Administration will include a requirement to use hydrogen technology for the ferry service Bodø–Røst–Værøy–Moskenes, which is part of the national road system".

Progress and emission reductions will also depend on the ability to take other considerations into account, for instance relating to the economy, food security, biodiversity, and adaptation to climate change.

The Government is using tax breaks and grants through Enova to ensure that businesses have the freedom and opportunity to choose electric vehicles. Facilities for shoreside electric power, charging infrastructure and later, infrastructure for alternative transport fuels such as hydrogen, ammonia, and biofuels, must be developed to facilitate zero-emission maritime transport. Enova is supporting the development of this type of infrastructure. Since its establishment in 2001, Enova has supported the implementation of more than 7 000 energy and climate projects. The Government has given Enova a clearer climate profile for the next four-year period, so that its purpose is to contribute to Norway's emission reduction commitment and contribute to Norway's transition to a low-emission society. Enova will contribute to the development of technologies necessary towards 2030 and the low emission society in 2050. Enova's activities focus on late-phase technology development and early market introduction. Grants for late-phase technology development help to speed up the pace and scale of pilot and demonstration projects and full-scale testing, so that new technologies and solutions reach the market more quickly.

Enova has a role to play in finding good solutions that meet the need for an energy system that is effective during a period of major change. For instance, coordination between thermal energy and the power system needs to be improved, and new technologies and solutions for energy storage and demand response must be developed.

2.3.3 Regional Policies, Plans and Legislation

2.3.3.1 Regional plans and decarbonisations objectives and goals of Nordland County Council

Regional plan for climate and environment[25] is anchored in the regional strategic plan 2016-2020[26], but it also reflects the strategies and goals of the ongoing strategic plan 2021-2024[27] and underpins actions towards Sustainable Nordland 2030. As a link between state, municipal and other regional authorities, Nordland County Council is responsible to contextualize national goals and guidelines.

December 2020 The county council decided and implemented a climate budget of its own activity. This to support the ambition of the Nordland County administration (NFK) to reduce its own greenhouse gas. Climate accounting can have different perspectives such as direct emissions perspective or footprint perspective. Directly through, for example, fossil fuels and

24 Energi til arbeid – langsiktig verdiskaping fra norske energiressurser. Meld. St. 36 (2020 –2021) Melding til Stortinget. https://www.regjeringen.no/contentassets/3d9930739f9b42f2a3e65adadb53c1f4/no/pdfs/stm202020210036000dddpdfs.pdf

25 Regional plan for klima og miljø Grønn omstilling i Nordland. https://www.nfk.no/_f/p1/i0f2472c2-a95a-40a8-bcbb-5b2a8f0628cc/regional-plan-klima-og-miljo.pdf

26 FYLKESPLAN FOR NORDLAND 2013–2025 REGIONAL PLAN https://www.nfk.no/_f/p1/ibfae97e8-dc3b-434d-aec6-b57d3e806dba/fylkesplan-for-nordland-2013-2025-webversjon.pdf

27 Et bærekraftig Nordland Planstrategi for samarbeid og grønn omstilling 2021–2024. https://www.nfk.no/_f/p1/i0d31bc9a-11bf-42b0-9521-b617bd7ec635/byraa_et_barekraftig_nordland_2021_web.pdf

footprints/indirectly through trade in goods and services. A climate budget should be integrated into the financial budget to be an effective management tool.

Objectives and sub-goals until 2030:

- Greenhouse gas emissions in NFK must be reduced by 60% by 2030, compared to 2009.
- In 2030, industry and business in Nordland will be a global player in green transition.
- Nordland has municipalities that are capable of adaptation, that manage climate risks, and utilizes the opportunities of a changing climate.
- In 2030, the infrastructure in Nordland for fossil-free fuels is well developed.
- In 2030, the transport sector in Nordland has reduced its greenhouse gas emissions by 70% compared to 2009.
- In 2030, the energy demand for the building stock in Nordland has been reduced by 20% compared to 2009.
- In 2030, construction and construction sites in Nordland will be fossil-free.
- In 2030, the agricultural and aquaculture industry in Nordland has reduced fossil emissions by 50% compared to 2009.

These objectives are obtained through instruments as green public procurement, energy efficiency and a transition to fossil-free transport. Renewable energy is the key to sustainable growth and zero emissions. Furthermore, use of short-distance power will reduce the need for power lines and reduce energy loss in the transmission network.

The action program of NFK is revised every one or two years and an assessment is made of whether the Climate action plan are on track to achieve its goals. The implemented Climate Budget tool is important to make this assessment. The climate and environmental plan will be a guide for other regional plans such as the regional transport plan and areal plans.

The Nordland County administration plays a decisive role to facilitate networks and partnerships, to encourage dialogue, cooperation, and exchange of experience. Changing attitudes and actions is an important element in bringing about a transition to a climate-adapted low-emission society.

5 strategies for good climate communication:

- Motives through social networks. Motivation for climate- and environment-friendly choices should therefore take place through existing networks and groups.
- Relate climate to other important topics. Must show which options exist and what those options lead to.
- Point people in the right direction. Make it easier to make climate- and environment-friendly choices.
- Use the power of stories In order to reach more people with knowledge about climate and to change behaviour and attitudes, we should open up more ways to talk about climate change
- Who delivers the message matters.

Networks, meeting places and partnerships are recommended to mobilize the public, private and civil society in work on transitioning to a low-emission society. Collaboration in networks such as Klimapartnere Nordland, which includes various industries and the public sector, is a good example of a forum for developing new solutions and increasing competence.

2.3.3.2 Regional strategies for decarbonisation of Nordland County Council

In Nordland, electric power is today the dominant source of energy with approx. 57% of total consumption. Other major energy sources are petrol and auto diesel (10%), fossil fuel industry (8%),

marine gas oil and jet paraffin (7%) and wood, district heating and heat pumps (7%). Stationary energy consumption (mainly construction and industry) accounts for approximately 78% and the transport sector for 22% of consumption.

Strategy 1: The environment and climate challenges require investment in education, research, and innovation. Climate and environmental perspectives should be incorporated into educational plans and curricula from kindergarten to higher education. The upper secondary schools will also be important arenas for communicating the climate message.

Strategy 2: Public procurement is a powerful tool for reducing the footprint of public enterprises and for establishing and promoting markets for circular products and services. By setting requirements in procurement within construction, food, transport, electronics, office furniture, etc. the public creates a demand for circular products with a low climate footprint.

Strategy 3: Green industrial development based on renewable energy. Industry in Nordland plays an important role in production. Renewable energy carriers such as hydrogen and biogas and minerals and metals as well as the production of new technologies such as batteries. At the same time, the industry is a source of almost half of all greenhouse gas emissions to the air in Nordland, and it is important that arrangements are made for the industry to develop and adopt low and zero emission technology, as well as to streamline the use of energy and raw materials.

Strategy 4: Building infrastructure for future energy systems. Distribution of grid costs is a challenge in the current user-financed model and investment in power grids is a high financial threshold for many sectors when it comes to converting to electric operation. We also follow developments in the use of batteries as grid support, and as a possible alternative to provide greater flexibility in the grid with lower costs and planning requirements. To meet electric car drivers' needs for charging, arrangements must be made for charging along transport corridors and at workplaces, visitor buildings and housing associations. Ships that are docked can reduce their emissions by using shore power instead of their own diesel engines.

Strategy 5: Create greater flexibility in the energy system. Local production of renewable energy is part of today's and future's energy system. Today, there are various sources of renewable energy. The largest sources come from hydro and wind power. Of other sources of renewable energy, the most common are heat pumps, district heating, wood burning, geothermal heating and solar energy. These can have great potential and are used as energy supplies for both construction and industry. Little space-consuming, Solar energy on roofs and other existing surfaces is a good example. Contribute to creating greater flexibility in the energy system by providing both electricity and heat without major losses in the power grid. District heating plays an important role by utilizing waste resources and waste heat and provides greater flexibility in the energy system by relieving the power grid and reducing the need for investment in the power grid.

Strategy 6: Use efficient transport systems and climate-friendly forms of transport. In order to reach the climate targets, requirements must be set for zero or low emission solutions based on technological neutrality. It is likely that the solutions within road traffic will be different, but electrification will play a key role and as a supplement where electrification is not appropriate, other energy carriers such as hydrogen, hybrid technology. In collaboration with Vestland, Trøndelag, Nordland and Troms and Finnmark county council in the project Fremtidens hurtigbåt, work is being done to develop the world's first zero-emission speedboat. Hurtigbåt

Strategy 7: Energy efficiency of buildings. Energy efficiency measures in buildings reduce greenhouse gas emissions and are often economically profitable. Freeing up energy use in the building stock is also crucial to cover the growing need for electricity in the transport sector. Tools such as energy management and smart energy management systems and systems for energy storage must be used to reduce energy use in buildings.

2.3.4 Local Policies, Plans and Legislation

2.3.4.1 Local plan and decarbonisation goals of Bodø Municipality

Bodø Municipality will create good local communities for its residents and is an active contributor to achieving the UN Sustainable Development Goals. This due its responsibility as a planning authority, a buyer and developer, as owner and operator of infrastructure, buildings, and roads, and as its key role in sustainable social development.

The Climate and Energy Plan 2019-2030[28] is the governing document for Bodø Municipality's efforts relating to climate and energy. The Climate and Energy Plan is also part of the municipality's overall 'smart initiative', which defines an area of opportunity for sustainable growth.

The Climate and Energy Plan is strongly linked to the municipality's Smart City initiative and its vision to create a more human- and environmentally friendly city. One of the key areas of the smart initiative focuses precisely on climate and environmental considerations and renewable and efficient solutions relating to energy use. The Climate and Energy Plan is a cross-sectoral thematic plan which borders on many of the municipality's priority areas and other plans:

1. The municipal master plan's societal section (KPS)[29] sets out guidelines and anchoring for the municipality's planning and project work. Bodø Municipality shall facilitate the development of a compact city and local communities where new solutions create attractive residential and living conditions, within the framework of climate and environmental considerations.
2. The municipal master plan's land-use section (KPA)[30] is the municipality's management tool for the use and protection of land.
3. The municipal sector plan for cycling[31] describes how Bodø Municipality is working to achieve the goal of a 25% cycling share in 2025.
4. The plan states that an action plan will be prepared for stormwater management in the municipality.
5. The Regional Transport Plan for Nordland 2018-2029[32] sets out transport policy guidelines for the county, with action plans relating to public transport, commercial transport, county roads and cycling and walking.

Decarbonisation objectives Bodø Municipality:

- 2030 - Reduction in direct greenhouse gas emissions by 70% compared with the 2009 level.
- 2030 - Bodø Municipality shall have a recycling rate of 70% as regards household and industrial waste.
- 2050 - Bodø shall be a low-emission society.

Sub goals of Bodø Municipality its own enterprises

- 2025 - Bodø Municipality shall reduce its greenhouse gas emissions from new buildings and the refurbishment of existing buildings by at least 35% compared with the industry norm in 2017.
- 2025 - Energy consumption in Bodø Municipality's existing building portfolio shall be reduced by at least 25% compared with the 2009 level.

---

[28] FOR-2018-09-28-1469 Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning

[29] Kommuneplanens samfunnsdel 2018-2030, Attraktiv hovedstad i Nord, Bodø kommune, vedtatt 9.5.2018

[30] Kommuneplanens arealdel 2018-2030, Bodø kommune, vedtatt 14.6.2018

[31] Kommunedelplan for sykkel 2018-2025, Bodø kommune, vedtatt 25.10.2018

[32] Kommunedelplan for grønnstruktur, Bodø kommune), vedtatt 14.9.2017

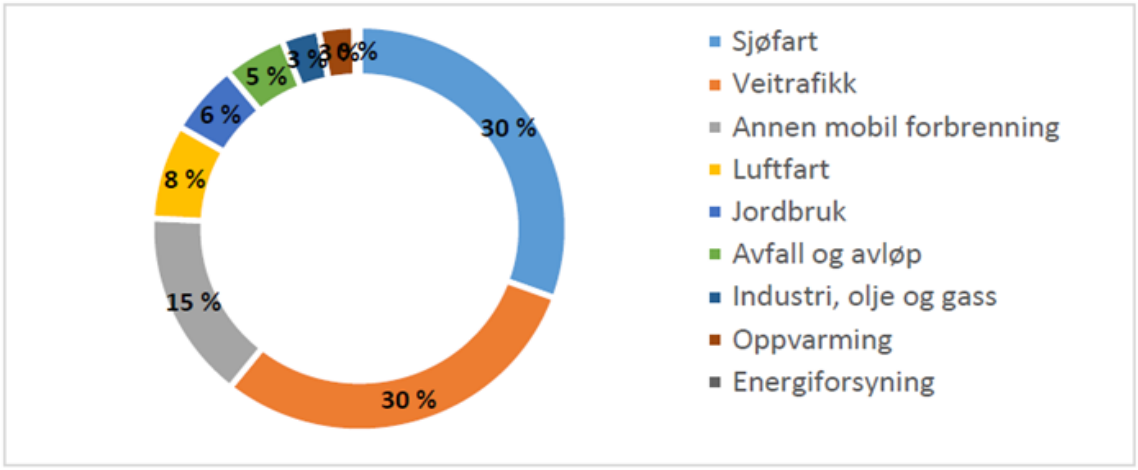
- 2030 - Bodø Municipality shall reduce its overall climate footprint by 50% compared with 2017.

2.3.4.2 Status of Direct emissions in Bodø Municipality

Direct emissions of carbon dioxide (CO2), methane (CH4) and dinitrogen oxide (N2O) within Bodø Municipality's boundaries was in 2016 measured to 204,000 tonnes CO^2e. Compared to baseline of 2009 and based on population development for this period, emissions has been reduced by 10% per capita in Bodø Municipality.

Road transport and shipping are two other largest sources of emissions in Bodø Municipality. Emissions from road transport are mainly linked to light vehicles such as cars, and these emissions were reduced by 7% between 2009 and 2016. Emissions from shipping rose by 15% from 2013 to 2016. The 'passengers' category (ferries, high-speed ferries, and cruise ships) accounts for this increase. The statistics also include through traffic. DNV GL has estimated that around 7% of national emissions from inland shipping originate from ships in port[33]. By providing onshore power to Hurtigruten alone, we will be able to save almost 4% of the total emissions originating from shipping in Bodø Municipality.

3% of Bodø Municipality's direct greenhouse gas emissions originate from industry. Bodø sildoljefabrikk AS accounts for 84% of emissions from industry in Bodø.



Shipping
Road transport
Other mobile combustion
Aviation
Agriculture
Waste and wastewater
Industry, oil and gas
Heating
Energy supply

[33] DNV-GL, 2014b. Sammenstilling av grunnlagsdata om dagens skipstrafikk og drivstofforbruk

Northern Periphery and Arctic Programme 2014–2020
EUROPEAN UNION
Investing in your future
European Regional Development Fund

Buildings and infrastructure account for just under 42% of the climate footprint (including investments, operations, maintenance, as well as the production and transport of construction materials). The largest emissions in this category are attributed to transport, housing, primary and lower secondary schools, the health service and roads, sewage and waste disposal (see Figure 3). 20% of the climate footprint of the municipality's operations stem from purchases of consumables, particularly in the health sector. Purchases of services contribute 17% of the municipality's climate footprint. The climate footprint of Bodø Municipality's operations by 21% between 2009 and 2017.

2.3.4.3 Local strategies and decarbonisation tasks for Bodö Municipality

Procurement: Procurement regulations will have clear requirements and guidelines concerning environmental considerations, which must be documented in all procurements. Bodö Municipality has decided that new procurement praxis will addresses environmental and climate considerations, as well as social and ethical requirements.

Energy, buildings, and construction: Bodø Municipality has implemented a strategy that encourage to choose construction materials that is:

- Short travel/locally sourced
- Sustainable materials, with a high recycling rate and low climate footprint.
- RES energy solutions in new-build projects.
- High energy efficiency in existing buildings.

After 1st of July the following energy and environmental requirements is enforced for the municipality's buildings:

- New build: passive house standard
- Refurbishments: passive house standard, provided that the buildings are not protected
- Partial refurbishments: passive house standard, provided that the buildings are not protected
- Existing buildings: Up one class from the previous energy classification in 2010

Review energy-intensive processes on construction sites that can be replaced:

- Construction machinery and equipment at the construction site
- Building heating and drying
- Transportation of personnel and materials to/from construction sites

An emission inventory shall be prepared for all municipal new-build projects, which will show the measures that are needed to reduce emissions by at least 30% relative to a reference building in accordance with the industry norm (TEK-17).

A ZEB building will be constructed according to the ambition level ZEB - O. Furthermore, Bodö Municipality will introduce a certification system such as BREEAM for new buildings, minimum level "Good". Through stakeholder engagement and dissemination of information the municipality will ensure that local construction industry is competitive about new requirements in planning and implementation of zero-emission buildings and zero-emission neighbourhoods.

To increase the use of wood materials in construction projects is also a priority.

- wood materials to always be competitive, in terms of emission inventories, indoor climate and economics and from a life-cycle perspective,

Transport and land use: A central strategy of Bodö Municipality is to reduce emissions from transport. This is done by:

- Enabling and influencing other major players to reduce car use and demand.
- Utilising the municipality's roles and instruments to reduce emissions from shipping.

Land-use section of the municipal master plan is the strongest instruments for reducing demand for transport and is facilitating walking, cycling and travel by public transport. Furthermore, the following concreate task will support sustainable sea transportation:

- Roll out onshore power to piers no. 1, 3, 4 and 5 in the Port of Bodø.
- Explore the possibility of onshore power for ships which require a high-voltage power supply (cruise ship size) in the Port of Bodø. Implemented by Nordlandsnett AS latest 2025.
- Continue the study of hydrogen as a fuel for heavy transport vehicles, rail and shipping – instigate the establishment of a hydrogen refuelling station in Bodø Municipality.
- Work to promote a smarter system for the high-speed ferries to reduce demand for transport in the inner harbour between the high-speed ferry terminal, the freight terminal and bunkering.
- Urban growth agreement in Bodø, will help to achieve the goal of zero growth of car use in the city.
- Use the scope open to the municipality to ensure that the Nordland Line is operated by hydrogen-powered traction in the future.

2.3.5 Conclusion

Climate change is a global problem, but emissions are caused by actions and processes at local level. All greenhouse gas emissions occur locally. The same applies to the consequences of climate change. Consequently, the greatest challenge of our time must also be solved locally. This section has outlined some of the key national, regional, and local polices in Norway – from government level in Oslo and implemented in Nordland County and Bodö Municipality. In Norway climate politics is close integrated in sector politics and the means to achieve the transition to Net Zero we find within energy sector, construction sector and transport sector.

2.4 Sweden

2.4.1 Introduction

Climate action and decarbonisation policy in Sweden is underpinned by a number of national policies, plans and legislation which are realised and implemented at both a regional and local level. There has been a substantial shift in national policy in recent years across the State, with climate action occupying a central and fundamental role in policy formulation and decision-making across all levels of national, regional and local government in Sweden. Some of the key policies and plans influencing climate action and decarbonisation in both Sweden, and at a local level in the City of Umea, have been briefly referenced and outlined below.

2.4.2 National Policies, Plans and Legislation

2.4.2.1 Sweden's climate policy framework[34]

In 2017, Sweden’s Riksdag decided by a large political majority to introduce a climate policy framework with a climate act for Sweden. This framework is the most important climate reform in Sweden’s history and sets out implementation of the Paris Agreement in Sweden. By 2045, Swedens

34 Sweden's climate policy framework - Government.se

mission is to have zero net emissions of greenhouse gases into the atmosphere. Current government has stated that Sweden's ambitious climate goals remains, and that the climate policy framework remains valid. The framework contains ambitious climate goals, a climate act and a climate policy council. The framework aims to create order and stability in climate policy. It provides business and society with the long-term conditions to implement the transition needed to address the challenge of climate change. For the first time, Sweden also has an act under which each elected state government has an obligation to pursue a climate policy based on the climate goals adopted by the Riksdag. Each government must provide clear reports on how work to achieve the goals is progressing, and an independent climate policy council reviews how well the government's overall policy meets the climate goals. The reform is a key component of Sweden's efforts to comply with the Paris Agreement. The new government has however announced a major overview of the Swedish climate work and instigated an inquiry which will provide the new guidelines for the climate work in Sweden[35].

2.4.2.2 Sweden's Climate Act and Goals

The Climate Act establishes the following:

- The government's climate policy must be based on the climate goals.
- The government is required to present a climate report every year in its Budget Bill.
- Every fourth year, the government is required to draw up a climate policy action plan to describe how the climate goals are to be achieved.
- Climate policy goals and budget policy goals must work together.

The framework contains several climate goals for Sweden:

By 2045, Sweden is to have zero net emissions of greenhouse gases into the atmosphere. This means that greenhouse gas emissions from activities in Sweden should be at least 85 percent lower than in 1990. The remaining 15 percent can be achieved through supplementary measures such as increased carbon sequestration in forest and land, carbon capture and storage technologies (CCS) and emission reduction efforts outside of Sweden. After 2045 Sweden should achieve negative emissions, meaning that the amount of greenhouse gas emitted is less than what can be reduced through the natural eco-cycle or through supplementary measures.

By 2030, emissions from domestic transport will be reduced by at least 70 per cent compared with 2010 (excluding domestic aviation which is included in the European Union Emissions Trading System).

By 2030, emissions in Sweden in the sectors covered by the EU Effort Sharing Regulation should be at least 63 per cent lower than in 1990, out of which 8 percent may achieved through supplementary measures.

By 2040, emissions in Sweden in the sectors that will be covered by the EU Effort Sharing Regulation should be at least 75 per cent lower than in 1990, out of which 2 percent may achieved through supplementary measures.

These goals also reflect Sweden's aim to show international climate leadership, and to show that Sweden undertakes to achieve emission reductions that far exceed the requirements under the EU Effort Sharing Regulation.

35 Snabbutredning för att analysera svensk klimatpolitik baserat på Fit for 55 - Regeringen.se

2.4.3 Regional Policies, Plans and Legislation

2.4.3.1 Regional development and climate strategy 2020-2030[36]

The Region council of Västerbotten has committed to a regional development strategy. In the partial prioritization 4.4 named "Sustainable consumption, inclusive energy use" states that *"All actors in society are consumers, from individuals to companies, authorities and organisations. The consumption choices they do is decisive for the environmental and climate impact that occurs globally, at all stages of the chain, from raw material to final use. In order to achieve sustainable consumption, a circular approach is required, such as reusing and recycling."*

Another important environmental gain, in which there is solid experience in Västerbotten, is energy efficiency and energy recycling.

Through its renewable energy resources, Västerbotten has unique prerequisites for the establishment of electricity-intensive industry, which in turn creates further opportunities for efficient energy recovery.

A large part of the electricity production takes place in the northern parts of the county, where wind and hydropower are the main sources. Large energy losses in connection with the transmission of electric power and bottlenecks in the infrastructure create advantages for establishment close to the electricity production in the north. Access to sustainable energy is also important from a climate perspective, as well as a circular perspective.

The climate strategy states that the region must reduce its climate impact by 60 percent by 2030. In 2045, the region must be climate neutral, which means that it must reduce their emissions by 8 percent per year. Overall areas where the region has the greatest impact on the environment and where activities will be carried out are:

- Climate neutrality and mitigation
- Healthy and non-toxic environment
- Sustainable use of resources

2.4.3.2 County administrative board climate role and strategy[37]

The County Board's role is to coordinate the regional work with the environmental goals. They work together with municipalities, businesses, voluntary organizations and other actors, so that the environmental goals will have an impact in the county and the environment will improve. The County administration board also follow up on how the environmental work is going. The County Administrative Board shall:

- coordinate the regional target and follow-up work
- develop, coordinate and implement regional action programs with broad roots in the county to achieve the generational goal and environmental quality goals
- support the municipalities with data in their work with the generation target and the environmental quality targets
- work to ensure that the generational goal and the environmental quality goals are reflected in local and regional social planning and contribute to their consideration in the regional growth work.

36 Regional utvecklingsstrategin (RUS) 2020–2030 (regionvasterbotten.se)

37 Miljömål | Länsstyrelsen Västerbotten (lansstyrelsen.se)

The county administrative boards in Sweden have been commissioned by the government to produce regional plans for infrastructure for electric vehicles and renewable fuels and work on implementing these plans. The purpose of this plan is to promote and coordinate an expedient expansion of distribution facilities for renewable fuels (filling and charging stations).

2.4.4 Local Policies, Plans and Legislation

2.4.4.1 Umeå climate roadmap[38]

Umeå's climate roadmap is two things at the same time: a compilation of what needs to be done to reduce climate emissions in Umeå, and a platform where the whole city of Umeå can strengthen each other and work together for climate change in accordance with the Paris Agreement.

The climate roadmap is coordinated by the City of Umeå, but the content is created jointly with companies and organizations who joined the endeavor.

The roadmap has five focus areas where everyone in Umeå is needed to reduce emissions:

1. Mobility and transport
2. Energy and the built environment
3. Consumption and circular economy
4. Food and agriculture
5. Other supplementary measures

Signatory organizations commit to sharing information annually on activities and results in their climate work. These can be reported through one or more of the following:

a) The organization's external sustainability report
b) Open on the Umeå climate roadmap website
c) Other way specified in the undertaking

The aim is a climate-neutral municipality in 2040 and that the City of Umeå is climate-neutral in 2030.

2.4.4.2 Umeå climate action plan[39]

To limit the global temperature increase to 2 degrees Celsius, and ideally to no more than 1.5 degrees, everyone must contribute to reducing greenhouse gas emissions. At a local level, everyone who lives and work in Umeå must contribute by reducing our climate-impacting emissions. Greenhouse gas emissions from energy use per inhabitant in Umeå has been steadily decreasing since 1990, however as the population of Umeå is growing, the actual emissions have remained essentially the same since the 1990s. The same is true for consumption-related emissions which have remained stable at the national level in recent years. In Umeå, consumption-related emissions in 2018 were 11.5 tonnes per person per year, according to a survey of consumption habits commissioned by City of Umeå. A long-term sustainable level is 1 tonne per person per year, which must be achieved by 2050 if we are to meet the goals of the Paris Agreement. Activities and goal in Umeå Climate Action plan:

- Municipality of Umeå will be climate neutral 2040, net zero emissions of greenhouse gases.

38 Umeå klimatfärdplan - Umeå kommun (umea.se)
39 Åtgärdsprogram för Umeå kommuns miljömål 2022-2025 (umea.se)

- The Umeå municipal group will be climate neutral by 2025, net zero emissions of greenhouse gases.
- The climate impact of transport in Umeå will be reduced, this will be done by fuels are fossil-free
  by 2030 and that sustainable travel increases.
- City of Umeå consumption-based climate impact is reduced to 2 tonnes of CO_2 equivalent per equivalent per person by 2040 and 1 tonne by the year 2050.
- By 2025, the share of journeys by public transport, bicycle or on foot combined is at least 65 per cent of all trips for residents in the Umeå urban area.
- By 2040, the air in Umeå is so clean that human health and animals, plants and cultural values are not harmed.
- By 2025, green corridors and areas have been developed in Umeå's urban centres with new and existing parks and green public spaces.
- In 2025, the inhabitants of Umeå have good access and accessibility to parks, squares, and recreational environments with good sound environment.
- By 2025, Umeå has buildings with low energy use and environmental impact.

2.4.4.3 Umeå Digital Climate road map[40]

The municipality is working to reduce emissions of greenhouse gases and to phase out fossil fuels. To achieve this, changes are required throughout society, where the municipality, companies, organizations and residents must work together. To gather companies and organizations around a common goal, Umeå municipality works with a digital tool called Climate OS. In the tool, one can see what the emissions in Umeå look like today and possible solutions to deal with them. The tool currently shows a selection of measures and does not yet provide a complete picture of what is being done in Umeå to reduce emissions. The tool is continuously developed with new solutions, better data, and more actions.

2.4.4.4 Climate Neutral Umeå 2030[41]

Umeå Municipality is one of 23 municipalities and six authorities that have signed the Climate Contract 2030. It is a contract between cities and authorities to accelerate the development of climate neutral cities.

To achieve the big change in the short term, we will require unprecedented cooperation between citizens, politicians, businesses, and civil servants. National, regional and local levels must work together in the same direction. The Treaty sets out the way forward.

Climate Contract 2030 is part of the Climate Neutral Cities 2030 initiative within the Viable Cities strategic innovation programme, of which Umeå is a part. It is also part of the European Commission's initiative for 100 climate neutral cities by 2030. It will contribute to the transition by bringing many people together and testing new ways of working. The Climate Contract will be revised every year in December.

Umeå municipality`s commitments:

- Implement the Umeå Local Group Action Programme to achieve agreed climate targets.

40 Umeå kommun (climateview.global)

41 Klimatneutrala Umeå - Umeå kommun (umea.se)

- Gather strength for Umeå's climate transition together with business, civil society and academia, by coordinating and implementing the Umeå Climate Roadmap, Umeå's local climate contract.
- Create a force for change in the region by establishing Umeå as a hub for innovation in sustainable and equitable urban planning, including by supporting innovation projects in cooperation with other cities in northern Sweden.
- Establish a creative hub where different competences are cross-fertilised, strengthening creativity and innovation, and playing an important and cross-sectoral role in the green and digital transition, in line with the New European Bauhaus.
- Strengthen Umeå as a logistics and energy hub in the region by enabling sustainable transport and logistics solutions.
- Develop a new energy plan for the City of Umeå, based on scenario analyses of Umeå's future energy system.
- Actively participate in the EU mission - 100 climate neutral and smart cities by 2030.
- Continue to develop the "System demonstrator for a climate neutral Umeå based in the new Tomtebo strand district" and the "Roadmap for mobility hubs" system demonstrator together with Uppsala and Linköping.
- Continue to develop forms of cooperation with civil society and residents, for example in UMECOM - Umeå's Citizens' Workshop.

2.4.5 Conclusion

As an engaged actor striving for global and international agreements and frameworks, climate measures and carbon dioxide emissions are a significant political focus area in Sweden with broad political support. Policy goals and objectives are driven at national level and supported by regional and local policies, plans and strategies that help realize these goals at local level. Together with the third pillar of the national framework, which is a climate policy council which act as an independent, interdisciplinary expert body tasked with evaluating how well the Government’s overall policy is aligned with the climate goals established by the Parliament and the Government. This to guarantee that it will not be easy to thwart the climate work in the event of temporary changes of opinion on the part of the political leadership[42]. This section has described some of the most important national, regional and local policies in Umeå Municipality that support Sweden's (and Umeå's) journey and transition to Net Zero and help deliver a climate-neutral economy by 2045.

2.5 Iceland

2.5.1 Introduction

Iceland has been actively working on decarbonization efforts and has set ambitious goals to reduce its greenhouse gas emissions. Here are some key aspects of Iceland's decarbonization policy:

- Carbon Neutrality: Iceland has set a target to become carbon neutral by 2040. This means that the country aims to balance its greenhouse gas emissions with carbon removal or offsetting measures, effectively eliminating its net contribution to global warming.
- Renewable Energy Transition: Iceland has been focusing on transitioning its energy sector to rely even more on renewable sources. The country's abundant geothermal and hydroelectric resources play a significant role in this transition. By increasing the share of renewable

42 Sweden's climate policy framework - Government.se

energy in its electricity production and promoting the use of electric vehicles, Iceland aims to reduce its dependence on fossil fuels and decrease carbon emissions.

- Transport Sector: The Icelandic government has been implementing measures to decarbonize the transportation sector, which is a significant contributor to greenhouse gas emissions. The promotion of electric vehicles (EVs) through incentives, subsidies, and the expansion of charging infrastructure has been a key strategy. Additionally, efforts have been made to increase public transportation options and encourage the use of renewable fuels in the aviation and maritime sectors.
- Industry and Innovation: Iceland has been fostering innovation and sustainable practices within its industries to reduce emissions. This includes promoting energy-efficient technologies, encouraging the adoption of renewable energy sources in industrial processes, and supporting research and development in green technologies.
- Carbon Pricing: Iceland has implemented a carbon pricing mechanism, known as the Carbon Budget Act, which puts a price on carbon emissions. The aim is to provide economic incentives for businesses and individuals to reduce their carbon footprint and invest in cleaner technologies.
- International Collaboration: Iceland actively participates in international efforts to combat climate change and decarbonize the global economy. The country has been involved in initiatives such as the Paris Agreement, which aims to limit global temperature rise, and has cooperated with other countries on knowledge-sharing and technology transfer related to decarbonization.

In 2020, the Icelandic government published its sustainable energy policy towards year 2050. Total CO_2 equivalent emission in transport and production sectors with Icelandic responsibility is currently close to 3 million tons but needs to be reduced by 40% before 2040 (reference year is 2005). This goal of 40% reduction can be compared with the current global goal of 43% reduction before 2030, relative to 2019. Since Iceland has already achieved emission reduction in all electric power production (hydropower and geothermal steam) and space heating, the main polluter is the transport sector (vehicles, ships, aeroplanes). The remaining pollution is handled internationally through the ETS system. Land Use, Land-use Change and Forestry (LULUCF) is excluded from this discussion. The direct Icelandic responsibility boils down to 55% reduction before year 2030 and full energy transition before 2040. Note that this means that Iceland will become the first nation to achieve full energy transition.

2.5.2 National Policies, Plans and Legislation

The energy policy states: “By 2050, fossil fuels will have been entirely replaced by renewable energy sources. The country will have achieved carbon neutrality by 2040, as planned. Energy security has been achieved through a supply of varied renewable energy options and sound infrastructure.”[43] This goal will be achieved through various actions directed towards different sectors. Actions within each sector to achieve energy transition is currently being developed and the Energy Fund is being expanded to support the transition with increased funding.

2.5.3 Regional Policies, Plans and Legislation

Iceland is treated as one region when it comes to the transition from fossil fuel to renewable energy. It is clear that more renewable energy will need to be provided and that this energy will need to be produced in different regions in Iceland and distributed with improved power grid. Debate is on-

43 Sjálfbær orkuframtíð : Orkustefna til ársins 2050. (2020). Atvinnuvega- og nýsköpunarráðuneytið.

going between government and municipalities on how to achieve this goal with minimum impact (concerns are mostly due to increased tourism, since power plants may have negative visual impacts). Only one hydropower plant of 95 MW can be expected to be installed within the next few years and one 120 MW wind farm. Even those two projects struggle to get approval from the municipalities. A larger share of the electricity sales going to municipalities is being discussed.

2.5.4 Local Policies, Plans and Legislation

Iceland has 64 municipalities, ranging from only 42 individuals in the smallest municipality to 136 thousand in the largest one (Reykjavík capital). The most urban municipalities usually have published their environmental policies. On January 1st 2023, new legislations came in force addressing the circular economy[44], honouring the Paris agreement and forcing all municipalities to publish their climate policy[45].

2.5.4.1 Akureyri municipality

In 2016, an environmental and transport policy was put forward[46]. A dedicated sustainability focus company called Vistorka (vistorka.is) was established in 2015 by Norðurorka (local power distributor, owned by the municipality). Recent activities include a pre-feasibility study for a biomass plant and overseeing electric vehicle charging infrastructure.

2.5.5 Conclusion

Iceland has set high targets to achieve a full transition to renewable energy, fully eliminating fossil fuel use in the coming decades and as soon as possible. This is technically achievable, but it remains to be seen if the cost can be covered in a sustainable way, without harming the competitiveness of Icelandic products and service on the international market. The most carbon-intensive sectors may need to re-think their energy strategies, but if they do so, with the help of national incentives, they may achieve cutting edge in the carbon free future ahead.

2.6 Faroe Islands

2.6.1 Introduction

The Faroe Islands are an archipelago in the Northeast Atlantic consisting of 18 islands inhabited by 54,500 people. The economy is mainly based on sea fisheries and fish farming which produce around 95% of the export revenue.

The use of energy and the development of energy systems have been the same as in the surrounding countries. Historically peat and (local and imported) coal was used for heating and cooking, animal fat was burned for light, grain mills were run by hydropower, transport on land was manual with help from animals and transport on sea was manual rowing with the help from sails and wind. Around 1920 electricity production was initiated both from hydropower and from engines running on diesel. These installations were mainly based on municipality initiative and used both for industry and in private households. In the 1950s and 1960s oil burners replaced the use of peat for space

44 https://www.althingi.is/lagas/153b/2003055.html

45 https://www.althingi.is/lagas/nuna/2012070.html

46 https://www.akureyri.is/static/files/01_akureyri.is/pdf/umhverfis-og-samgongustefnan-lokaskjal-med-breyt.baejarstjorn.pdf

heating. During the decades the number of cars increased, and boats and larger vessels had diesel engines installed. Soon the islands were heavily dependent on imported oil.

During the oil crises in the early and late 1970s it became apparent how dependent the islands had become on imported oil and what impact it had on supply security and economy. In June 1979, a law was passed establishing an energy council. The council was staffed with experts and investigated and gave advice on hydro, wind and tidal power developments, use of waste heat, energy saving in the fishing fleet and insulation in buildings.

In the early 1980s the use of energy was not only a question of economy but had also become a part in the discussion on protection of the nature and environment. In March 1980, a Faroese environmental NGO was established as a voluntary association to create local action in response to the global environmental crisis. After some years with no activity the association was re-established in September 2014.

The Faroe Islands are within the Kingdom of Denmark but a Home Rule Act of 1948 establishes the Faroe Islands as an autonomous nation within the Kingdom and transfers to a locally elected parliament the legislative and administrative responsibility of a wide range of areas, including the conservation and management of marine resources, protection of the environment, sub-surface resources, external trade relations, financial policy, business regulation, taxation and customs, energy, transport communications, emergency preparedness, social security, culture, education and research. Fields of responsibility that remain under the authority of the Danish Government and Constitution include the police, the prison and probation service, law of legal capacity, family law and succession law, immigration and border control, financial regulation and supervision and aviation.

This dualism has had an impact on how the Faroe Islands are positioned within international agreements. The UN Climate Convention 1992 was ratified by the Realm, and therefore applies for the Faroe Islands. However, when ratifying the Kyoto Protocol in 1997 the Danish government took a territorial reservation for the Faroe Islands. The Faroese Government decided in 2016 to become a party to the Paris Agreement.

A brief summary of the developments over the past two decades is given below.

2.6.2 National Policies, Plans and Legislation

According to the political government coalition agreement in 2004 a working group was established to formulate a general energy policy. In 2006 the working group delivered a report with information on energy production and consumption and with recommendations to make the country independent from oil by increased use of renewable energy and increased energy efficiency also regarding the economy, supply security, nature and environment. Two main goals in the report were a) 20% of energy consumption in 2015 should derive from renewable energy and b) energy consumption in the fishing fleet should be reduced by 15% relative to the yield. This report and its recommendations may be considered as the beginning of a Faroese Climate Policy.

In spring 2008 the Faroese government started a process of formulating the first national Climate Strategy, and an Action Plan with 17 possible measures to reduce emission of greenhouse gases was published.

In December 2009, the Faroese Parliament adopted the first Faroese Climate Policy covering the years 2010-2020. The main goal was to reduce the emission of greenhouse gases with 20 % in 2020 compared to 2005. All major stakeholders participated in the process of writing the first Climate policy and all political parties in the Parliament voted for the policy. The progress in reaching the goals is published annually on the homepage of the Faroese Environment Agency.

In 2011 the Ministry of Trade and Industry published an overall plan for the public electricity sector including a series of conclusions and recommendations. In 2012 the Ministry established a working group to draft an Action Plan and recommendations for the future electric energy system in the islands based on renewable energy. The working group recommends 26 initiatives and seven specific and detailed initiatives within the areas of production, energy storage, consumption, and the electric system. The goal was to provide a solid foundation for a future energy system that is mainly based on renewable energy.

The political coalition from September 2015 had clear goals for the energy sector. The focus was on development and use of renewable energy to cover all electricity on land by 2030. Within 10 years at least half of all buildings, including private housing, should be heated by renewable energy. The use of renewable energy should be promoted with subsidies and tax schemes. All new public buildings should use renewable heating and a plan for conversion of existing building should be developed. Business development and education within renewable energy should be supported. In 2018 the Ministry of Health and Interior published a plan for Energy Policy on how to reach the 2025 and 2030 goals in the coalition agreement.

In November 2016 the Faroese Government announced that the Faroe Islands will comply with the Paris COP21 climate agreement and take stronger measures and targeted political initiatives to curb climate change. According to this agreement net zero emissions should be achieved by 2050.

In 2019, the Faroese Ministry of Health and Interior presented a proposal for a new Climate and Energy Policy for the Faroe Islands 2020 to 2030. The plan was never politically adopted but worked partly as a foundation for a new working group who in 2021 delivered a proposal to a new Climate and Energy Policy, which The Faroese Parliament adopted in May 2022, now covering the years 2022-2032 and containing 25 measures to reduce the emission of greenhouse gasses. Among these are establishing more wind farms and solar energy plants, to reduce the tax on electric cars and heat pumps, to ban oil boilers in new buildings and to support the removal of oil boilers in existing buildings. Other measures are the establishment of independent energy advice, to encourage energy-efficient ships and to phase out the use of high-GWP greenhouse gases (F-gases).

A new government came into power in December 2022. The new Ministry of Environment has given the Climate Policy from 2022 high priority. In May 2023 the parliament agreed on a new law on nature conservation.

2.6.2.1 SEV

Beginning around 1920 several electricity production facilities were installed mainly by the larger municipalities in the Faroe Islands. To be able to build larger hydropower installations several municipalities came together in 1946 and formed the electricity company SEV. By 1970 all municipalities in the Faroe Islands were members and owners of SEV which had become defacto monopoly of electricity production, distribution and retailing. SEV therefor has been a main player together with the political authorities in planning the electricity sector in the Faroe Islands.

In October 2014 SEV announced the 100by2030 vision which aims at reaching 100% renewable power system by 2030. At the Nordic Council Awards in Reykjavík in October 2015, SEV was awarded with the Nature and Environment Prize, for their ambitious targets and innovation, and for making substantial efforts in promoting renewable energy.

2.6.2.2 Wind energy in the Faroe Islands

Faroe Islands has among world best conditions for wind energy production with annual average wind speeds exceeding 10 m/s at possible wind sites. After the oil crisis in the 1970s some private wind turbines were connected to the grid but these were short lived. In 1993 SEV erected a 150kW Nordtank wind turbine which produced electricity into the grid until 2021.

In 2003 the private company Røkt erected three 660kW Vestas wind turbines which still produce electricity to the grid. In 2005 SEV erected three similar 660kW wind turbines, but these were dismantled when SEV in 2012 erected five new 900kW Enercon at the same place.

In 2012 a tender for new wind energy was launched and SEV as the winner erected in 2014 a new wind farm with a total of 11.7MW (13x900kW Enercon) close to Tórshavn. With this windfarm the total installation of wind tripled from 6.6MW to 18.3MW. In 2015 wind energy produced 55,8GWh or 17,7% of total electricity production.

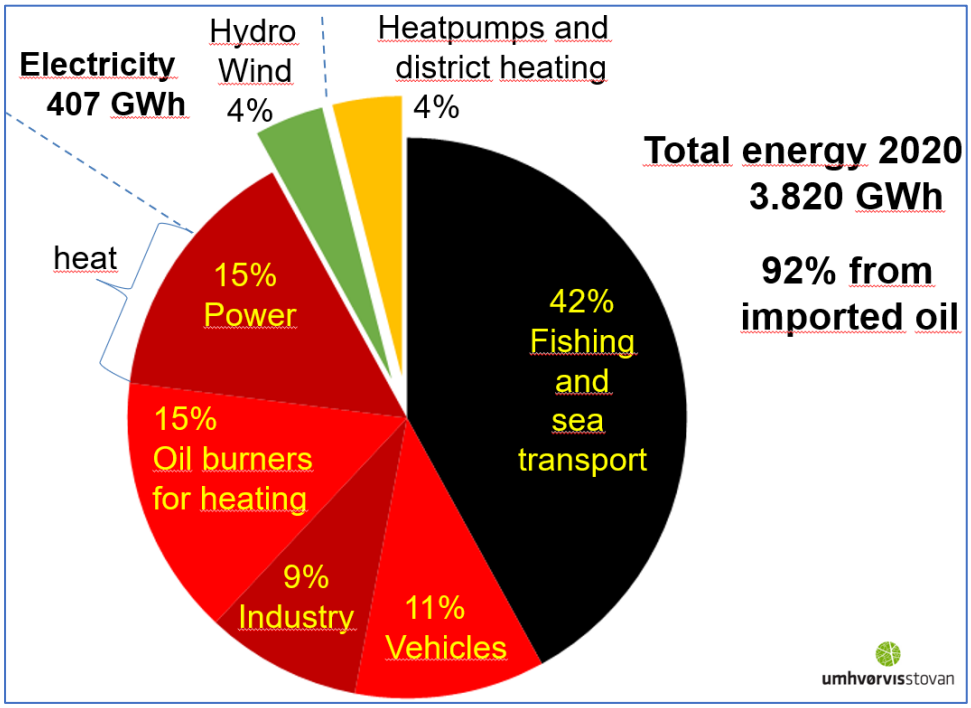
In 2020 after winning a tender SEV erected seven 900kW Enercon in the southernmost island Suðuroy. After installation of a battery and synchronous condenser this 6,3MW windfarm frequently supply 100% of the power usen in the island for periods reaching several days.

After tendering, two larger windfarms came online in 2022. The tenders were won by private company Vindrøkt which erected six 4,2MW Vestas and by Magn which erected six 3MW Enercon. Both windfarms are close to Tórshavn. With these new windfarms the total wind turbine installations has reached 67.8MW.

Wind power will play a crucial part in the new plan to decarbonise the islands. In addition to new turbines, it is also important to build a strong energy storage system.

2.6.2.3 Space heating and land transport

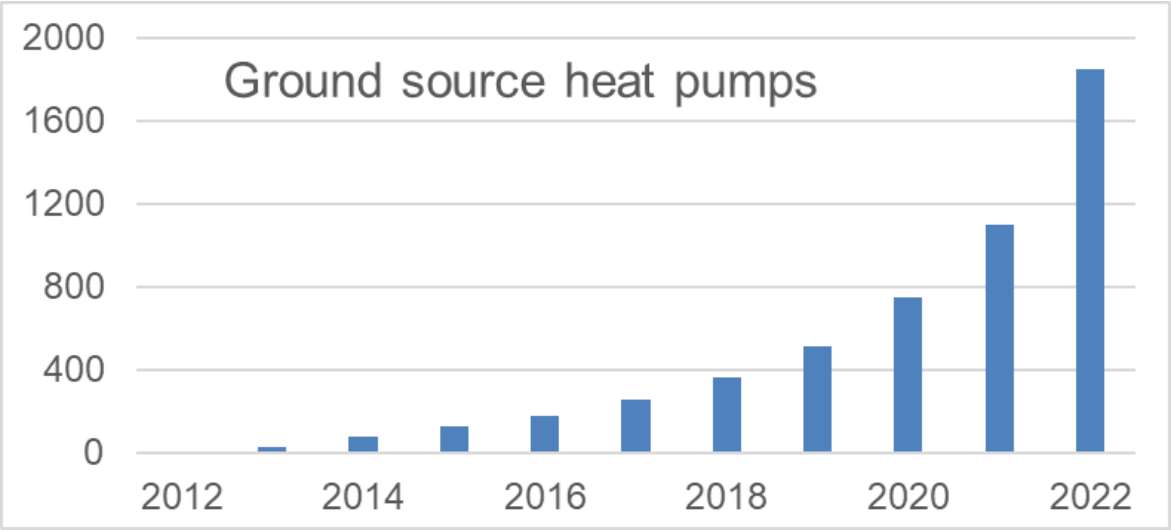
The total energy use in the Faroe Islands is seen in the figure below.

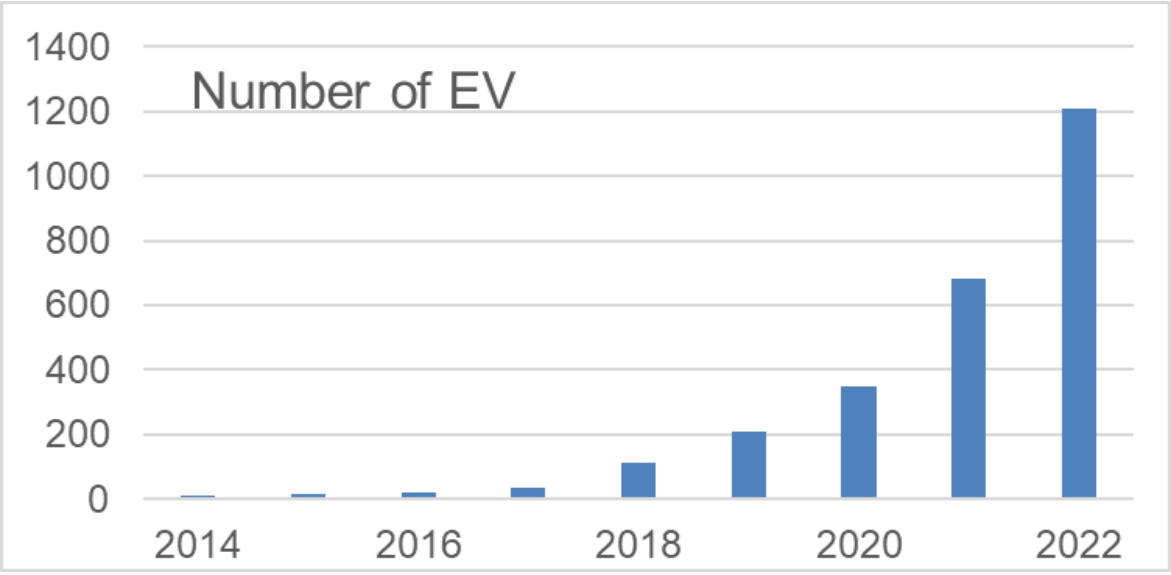


Fishing and sea transport accounts for around 42% of the total energy and there is no acceptable alternative technology to replace the oil used in this sector. However, for most of the other oil used in the Faroes there are alternative technology based on renewable energy. For space heating oil burners can be replaced by heat pumps and electrical cars can be used in land transport. The increasing demand for electrical power can be met by production form wind energy.

Although heat pump technology has been known for many years, they have not been in use in the Faroe Islands until 2007. With the sudden increase of the oil price in 2008 many house owners converted their heating from oil to electrical heat pumps. In 2008 investigation on using ground source heat pumps was initiated and this has become a popular heating technology in recent years.

As stipulated in political agreements several measures have been implemented to replace oil by renewable energy. From January 2017, a new building regulation came into force, which sets maximum energy consumption in houses. At the same time, electric cars and heat pumps were exempted from VAT. From May 2019 the price for electric power for heat pumps and charging of electrical cars was reduced by 26%. The first public car charging station was available in 2015. Today, there are 16 public charging stations located across the Faroe Islands. The uptake of ground source heat pumps and electrical cars is seen in the figures below.





2.6.3 Local Policies, Plans and Legislation

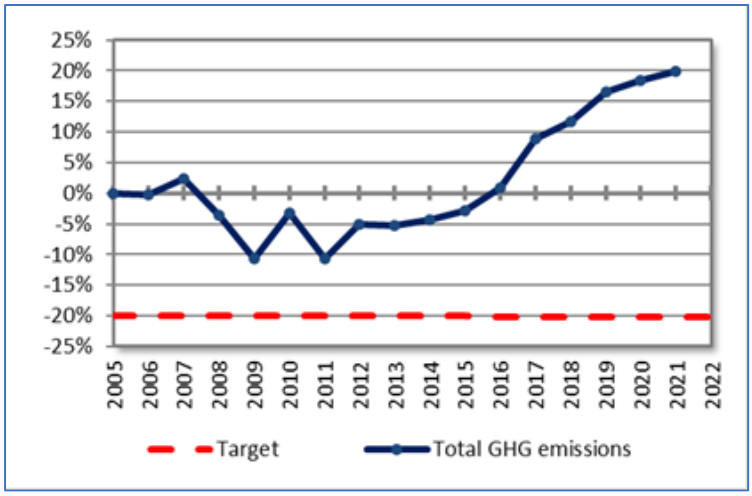
Many of the larger municipalities in the Faroe Islands have in recent years formulated policies for environment and energy with targets for reduction of emission of greenhouse gases. The goal of the municipality of Klaksvík is to reduce the emission of greenhouse gases 20 % in 2030 compared to 2005. In the Energy Policy 2021-2027 for the institutions in the municipality of Tórshavn the goal is to reduce the emission of greenhouse gases 50 % in 2027 compared to 2016 and with focus on 1) reduction in use of fossil fuels to heat institution within the municipality, 2) a shift to more energy saving street lightning and to 3) a shift from fossil fuel cars to electric cars. Tórshavn municipality has in 2020 installed three 15kWp solar panels on different buildings and several buildings have replaced oil burners with heat pumps in the most recent years.

In April 2023 a new heating system for a school and an elderly home in the village of Lorvík (1040 inhabitants) was inaugurated. In this system ground source heat pumps replaces oil burners. The system also includes large hot water storage tanks that can utilise excess wind energy.

The large industrial companies, including fish factories and fish farming facilities, are preparing for a decarbonised future. Hiddenfjord, one of the main fish farming companies, installed in 2022 a 195kWp solar system on the roof of one of their buildings and are preparing for more. Bakkafrost, another main fish farmer, built a new 15m fish farming service boat in 2022 that runs on electricity and the concept is prepared for using excess wind for charging. The Australian magazine Baird Maritime announced this boat to be 'Best Small Fish Farm support vessel 2022'. Several fish factories are preparing to produce process heat and steam from excess wind energy rather than oil burners.

2.6.4 Conclusion

Although the Faroe Islands are 'blessed' by renewable energy such as rain, wind, waves and tidal steams as well as sunshine during the summer almost all energy used in the islands derives from imported oil. However, there is a broad political agreement that the Faroe Islands should decarbonise all sectors. During the past two decades a range political agreements and initiatives have initiated the process to find solutions to replace oil. It can be said that there is an entirely new focus on sustainable energy compared to what there was 12 years ago. Now there are new proposals of specific measures designed to speed up the transition to sustainable energy and to avoid the shortcomings of the previous climate policy initiative from 2009. The goal was to decrease the emission with 20 % compared with 2005. However, in 2020 the emission was 18 % above 2005, see figure below. With the new focus it is expected that this will change in the years to come.



2.7 Conclusion

This section of the deliverable, entitled **Pathways to Decarbonisation in the Northern Periphery and Arctic (NPA) Region**, has considered the policy frameworks and roadmaps in place in each of the HYBES partner regions guiding the pathway to decarbonisation and progressing the goals and objectives of the European Green Deal, primarily the ambition to be climate-neutral by 2050. It has outlined the key national and regional plans and legislation in place in Ireland, Norway, Sweden, Iceland and the Faroe Islands which are guiding climate action and decarbonisation in each of the countries, and has highlighted the local actions and objectives that are taking place in the HYBES partner organisations to deliver the aforementioned national and regional plans, as well as the wider European policies and strategies, including the Paris Agreement, the EU Climate Law and the European Green Deal.

As has been previously discussed, decarbonisation and climate action are critical policy areas which have grown in importance across the European Union (and subsequently the HYBES partner regions), with significant funding allocated to actions and projects to meet the goals and objectives of European and national level climate actions policies and legislation. The HYBES project seeks to implement actions which are focused on decarbonisation and deliver on the relevant policies and plans in place in each of the partner regions, as well as at a wider European level.

The next section of this deliverable will utilise this policy roadmap to inform the development of the Joint Action Plan for the HYBES project, while it will also be used in the future to inform the project Capitalisation Plan. In particular, it will consider the proposed HYBES project activities and highlight alignment and compliance with the relevant policies, plans and legislation in the partner regions, and emphasise how the HYBES project will contribute to the achievement of this strategies.

3. Joint Action Plan for the HYBES project

3.1 HYBES Summary

HYBrid Energy Solutions for buildings, and infrastructure (HYBES) project will use the Quadruple helix approach to jointly create knowledge-based tools and activities for promoting improved energy efficient solutions to achieve substantial reduction of greenhouse gas emissions within the NPA region.

The project combines the concept of 'Living Labs' and the roll out of innovative tools to establish dedicated Decarbonisation Zones (DZ) in rural and peripheral regions. HYBES aims to build a knowledge-based ecosystem within rural communities to promote DZ opportunities and to build citizen capacity to achieve carbon neutral goals. HYBES will refine the 'Living Lab' concept in five partner regions; Norway, Sweden, Ireland, Iceland and the Faroe Islands. Through these Living Lab projects partners will build citizen knowledge and understanding about the importance and benefits of decarbonisation.

HYBES will engage with communities who often feel marginalised by carbon neutral policies. HYBES will demonstrate how decarbonisation measures can benefit communities and individual households both financially and environmentally using existing best practices and novel innovations. The critical element will be to demonstrate through tangible outputs and education the value of decarbonisation. The project will:

- Refine 5 'living labs' in regions to promote and develop dedicated Decarbonisation Zones in rural and peripheral areas which can be replicated across the NPA region & beyond.
- Identify good practices and techniques that can address decarbonisation challenges and help achieve carbon neutrality.
- Facilitate co-creation and citizen engagement as a means of building citizen knowledge around the benefits of decarbonisation.
- Offer interaction with communities and stakeholders within NPA region.
- Develop a 'carbon school' initiative which will enable school children to see first-hand the benefits of decarbonisation initiatives with the aim of developing curriculum change.

3.2 Overview of Policy Findings

The previous section of this deliverable, entitled **Pathways to Decarbonisation in the Northern Periphery and Arctic (NPA) Region**, has considered the policy frameworks and roadmaps in place in each of the HYBES partner regions guiding the pathway to decarbonisation and progressing the goals and objectives of the European Green Deal, primarily the ambition to be climate-neutral by 2050. It has outlined the key national and regional plans and legislation in place in Ireland, Norway, Sweden, Iceland and the Faroe Islands which are guiding climate action and decarbonisation in each of the countries, and has highlighted the local actions and objectives that are taking place in the HYBES partner organisations to deliver the aforementioned national and regional plans, as well as the wider European policies and strategies, including the Paris Agreement, the EU Climate Law and the European Green Deal. Decarbonisation and climate action are critical policy areas which have grown in importance across the European Union (and subsequently the HYBES partner regions), with significant funding allocated to actions and projects to meet the goals and objectives of European and national level climate actions policies and legislation.

The HYBES project seeks to implement actions which are focused on decarbonisation and deliver on the relevant policies and plans in place in each of the partner regions, as well as at a wider European level. The project objectives, activities and outputs are directly aligned with the aforementioned policies and legislation within each of the partner regions (and across the EU), and the following

sections of this deliverable will consider the objectives and activities proposed by the project and utilise this policy roadmap to inform the development of the Joint Action Plan for the HYBES project.

3.3 Transnational Co-Operation

Fundamental to the HYBES project is the need for enhanced transnational collaboration between NPA partner regions to identify and implement best-practices and build professional capacity in the programme priority areas. Partners within the HYBES project have various degrees of expertise and experience within the fields of energy efficiency and public engagement and behaviour change; however, the common territorial challenges regarding decarbonisation and climate adaptation remain the same. The enhanced opportunity for transnational cooperation and collaboration is essential in order to address these challenges, and facilitate and implement effective tools, techniques and best- practices across the NPA region to meet the challenges of climate change.

Transnational cooperation and cross border collaboration is imperative in order to consider the shared experience of the partner regions within this priority area and facilitate decarbonisation and a reduction in CO2 emissions in the participating regions. It is also essential to deliver the HYBES project objectives due to the geographical disparities and variances in knowledge across the project partner regions, which thus presents strong opportunities for the transfer of best-practices and sector-specific knowledge and education and build capacity in the programme priority areas. However, while regional disparities within the NPA programme area (and in the HYBES partners) exist in relation to expertise and experiences in the fields of energy efficiency and decarbonisation, as well as in stakeholder engagement and behaviour change, the common territorial challenges regarding decarbonisation remain the same. This enhanced opportunity for collaboration with partners in the NPA region provides a critical juncture through which this shared experience of a necessity for decarbonisation and climate adaptation can be addressed at a local, national and transnational level, and will facilitate the development and implementation of tools, techniques and regional best-practices across the HYBES project partner regions to approach the challenges of climate change.

As such, international cooperation is necessary in order to package 'the know-how' from all project partners and to enable the upskilling and capacity building of the energy, building and transport sectors within the municipalities, to ultimately contribute to achieving national, regional and local strategic energy objectives. This would not be possible at a local or national level, due to both a dearth of knowledge and expertise within all partner regions in relation to specific thematic focuses and activities of the HYBES project.

Additionally, in relation to the implementation of the Quadruple Helix Model of innovation within the HYBES project, as well as the key focus on behaviour change and community engagement, transnational cooperation once more provides an inherently valuable opportunity to both implement these new and innovative conceptual frameworks and activities and learn for experiences within the partner regions (Norway, Sweden, Ireland, Iceland and the Faroe Islands). This will provide a valuable juncture to both develop and embed the Quadruple Helix Model within the decision-making processes of each NPA region and learn from experiences and challenges in order to present a replicable and scalable best-practice framework for future legacy and implementation across the programme area.

Across the project, all partners have organisational strategic objectives to develop and implement energy efficient solutions for buildings and transportation. However, the degree to which knowledge and capacity around renewable energy solutions differs from region to region and is embedded within unique socio-economic characteristics. HYBES brings together different organisations across the NPA who have complementary expertise and skillsets suited to the delivery of decarbonisation goals in order to build and enhance citizen capacity, facilitate behavioural change and ultimately

achieve the key project objectives. The transnational nature of this proposal will enable and support collaboration between partners to develop best optimal solutions, identify best-practices, and deliver collaborative innovative pilots for decarbonisation.

3.4 Project Objectives

The HYBES project aims to use the Quadruple Helix approach and the Living Lab concept to develop and implement innovative actions that facilitate decarbonisation and advance carbon neutrality goals in each partner region. The project will develop policies and solutions that enable this shift to decarbonisation within defined districts, as well as proactively encouraging and facilitating behaviour change with stakeholders and local communities to further climate change adaptation and promote energy efficiency.

In order to achieve and deliver this high-level objective, the HYBES project has three sub-objectives, with several subsequent activities which will facilitate the delivery of the project.

Objective 1: Changing citizen behaviour:

- Identify and design a Living Lab model to be implemented for activities in the partner regions (A1.3).
- Consultative Stakeholder Workshops (A1.4).
- Interactive Engagement Spaces and Co-Creation Cafes (A1.5).
- Cultural Events and Festivals as platforms for developing decarbonisation awareness (A1.6).
- Guide to deliver the Living Labs model as a tool for the delivery of behavioural change for decarbonisation in other NPA regions (A1.7).
- Decarbonisation as an influencer for educational curriculum change (A2.4).
- Citizen's guide to decarbonisation: An end-users guide to influence behavioural change (A2.5).

Objective 2: Demonstrating energy efficiency models for management and monitoring:

- Macro energy analysis using the LEAP modelling technique (A2.1).
- Best practice models for energy efficiency, management and monitoring (A2.2).
- Energy monitoring and management tool for housing (A2.3).
- Energy monitoring and behavioural change for educators and educational facilities (A2.4).

Objective 3: Demonstrating effective flexible renewable energy solutions:

- Demonstrate solar energy solutions for decarbonisation (A3.1).
- Energy reduction and fossil fuel replacement (A3.2).
- Geothermal solutions for decarbonisation (A3.3).
- Energy infrastructure for low carbon transport systems (A3.4).

The three sub-objectives (and the subsequent activities identified to deliver these objectives) have been defined under three unique but interrelated works packages for the HYBES project:

- WP1 Changing citizen behaviour: Living Lab for Co-Creation and capitalisation for decarbonization
- WP2 Energy efficiency and management: Monitoring and assessment
- WP3 Flexible renewable solutions for the NPA region

3.5 Project Workplan

The HYBES project activities, deliverables and outputs have been outlined in **Appendix 1, 2 and 3**, and the activities undertake by the project to deliver the three core project objectives have been described below.

3.5.1 Activities addressing Objective 1

One of the key objectives of the HYBES project is to increase the capacity and understanding of decarbonisation among citizens across the NPA region, and subsequently facilitate behavioural change. This objective aligns with the European, national, regional and local policies and legislation within the partner regions, as has been outlined in Section 2, particularly in regard to the overall objectives of the European Green Deal. This objective follows a clear path from the design of co-creation labs within local communities, to developing educational tools and curricula to assist and empower school-aged children to adapt behaviours and build capacity and understanding of the role that decarbonisation can play in the delivery of climate change adaptation. The activities that the HYBES project will implement to deliver this objective have been outlined and briefly described below:

Activity 1.3 Identify and design a Living Lab model to be implemented for activities in the partner regions.

Led by UCC. Activity 1.3 will identify and design a cocreation Living Lab model for evidence-based Open Innovation (OI) that is linked to the UN Sustainable Development Goal's, the objectives of New European Bauhaus and the European Green Deal, and fundamental to understanding decarbonisation strategies. Activities will evolve a co-creation process, based on 'Design Thinking' steps that situates the cultural, societal, environmental, and regulatory contexts impacting decarbonisation. It will also involve an impact-by-design research platform that is based around ideation, co-creation solutions and implementation. This activity is an essential component of the project and will set the overall tone for citizen engagement and capacity building as a means of delivering designated Decarbonisation Zones in rural and peripheral locations across the partner regions.

Activity 1.4 Consultative Stakeholder Workshops.

Led by UCC. Using the Living Lab (LL) model and codesign process, Activity 1.4. will conduct and replicate a series of consultative workshops with key regional Quadruple Helix stakeholders across all partner regions. This collaborative inter-regional approach will allow the identification of key applications and specific functions (activities) on which there is apprehension and relative areas of interest which require further consideration. These consultative co-creation roundtables will be based on 'Design-Thinking' steps, focusing on topics that make decarbonisation activities more accessible and effective.

Living Lab Structure:

(A) Understanding and ideating: (i) Engage and Empathize (ii) Frame (iii) Ideate Together

(B) Co-creating solutions: (i) Co-Create

(C) Implementing Creations: (i) Anchor

LL topics include: best practice transfer, social inclusion, skills and knowledge transfer, researcher mobility, access to funding, and; industry/academia engagements and impacts on policy development.

Activity 1.5 Interactive Engagement Spaces and Co-Creation Cafes.

Led by UCC. We will create a collaborative, transnational interactive learning space consisting of 3 virtual Co-creation Cafes. These will be designed and implemented during the project with the intention to exploit them beyond the project life for a permanent support to co-creation processes. The Co-creation Cafes will facilitate ongoing interaction among the HYBES target groups - ensuring gender balance and a diverse mix of citizens of all ages, educational backgrounds. The aim of creating the Co-Creation Cafes is to facilitate experiential learning and a deeper understanding of the benefits of co-creation processes - where the engagement produces new cultural, environmental, societal and regulatory alignments.

Activity 1.6 Cultural Events and Festivals as platforms for developing decarbonisation awareness.

Led by UCC. Using the Living Lab concept and Cocreation Cafe, a strategic objective of this activity is to demonstrate and build awareness towards decarbonisation around cultural events. The project will engage in a minimum of two significant cultural events, creating public platforms that create awareness around low carbon societies. It will work in parallel with these cultural events as means to disseminate carbon neutral benefits to diverse public audiences - while paying particular attention to elucidate the cultural meaning and background of these measures to non-specialist and new audiences. In these ways, the co-creation processes will make use of cultural events as a means to promote decarbonisation - particularly relevant in the context of Bodø being appointed as EU Capital of Culture in 2024, Nova Gorica (2025), and Oulu (2026).

Activity 1.7 Guide to deliver the Living Labs model as a tool for the delivery of behavioural change for decarbonisation in other NPA regions.

Led by UCC. Using the Living Labs model devised and implemented in WP2, this activity will develop a guide which will identify Co-Design opportunities for improving energy performance and decarbonisation and will be structured in three parts: MAKING, SEEING, and INFORMING - such that it acts as a Guidance for Future decarbonisation projects across the Partner Regions and the EU. Each part will include a way of looking at project stages called a ‘temporal lens’ (e.g., looking back, forward, both). Focusing on the factors necessary to facilitate replication, this activity will include analysis of the barriers and enablers to implementation and will provide a critique of the regional disparities and socio-economic factors that influence the success of implementing the Living Labs model as a tool for empowering all citizens to achieve decarbonisation. This guide will describe the inherent value of the project and its activities to the Partners and to different civic and public audiences.

Activity 2.4 Decarbonisation as an influencer for educational curriculum change.

Led by NCE. The Cork region will collaborate with the Swedish and Norwegian regions to develop a behavioural change energy management system for 2nd level students, and 3rd level Architecture students, which will provide a live demonstration on the benefits of decarbonisation. This tool will be developed collaboratively and piloted in Cork and will provide live data streams and monitoring reports. The energy monitoring will allow schools to understand their energy usage which will

provide key insights into the steps and processes required to reduce their energy consumption, resulting in monetary and carbon savings. Measuring and verifying energy usage prior to implementing any corrective actions gives schools a clear view of the benefits and rewards affiliated with future energy reduction strategies. An educational module will be implemented over a 12 week term as part of the pilot and will educate young people and future professionals in the areas of sustainability and DZ awareness.

Activity 2.5 Citizen's guide to decarbonisation: An end-users guide to influence behavioural change.

Led by NCE. Using the Carbon Schools initiative collaboratively designed and implemented in WP2, this activity will document and develop a roadmap to deliver curriculum change in education to influence behavioural change for the delivery of decarbonisation across the NPA region (and further afield). The roadmap will provide tangible steps which will enable the replication of the Carbon Schools model in other educational settings, with the medium-term goal of influencing third-level education and continued professional development (CPD) as a means of building capacity and knowledge in the area of decarbonisation. This is an important objective which seeks to strongly influence and mould effective and energy conscious young professionals and future decision-makers to ensure that future developments in the area of decarbonisation are embedded within the lenses of energy efficiency and sustainability policy and implementation.

3.5.2 Activities addressing Objective 2

The HYBES project also focuses on demonstrating energy efficiency models for management and monitoring to analyse how locally produced renewable energy solution can be utilised by buildings across the NPA region (both new-build and retrofit). To achieve this objective, HYBES will identify the key best practice energy efficient models which are currently being utilised in each of the partner regions, with the purpose of documenting the best practice models so that they can be upscaled and transferable to other regions. In addition, HYBES will also pilot innovative energy monitoring systems within social and rural housing to assess energy usage and improve efficiency. This is particularly pertinent in light of the ongoing energy crisis across both the NPA and the EU. The activities that the HYBES project will implement to deliver this objective have been outlined and briefly described below:

Activity 2.1 Macro energy analysis using the LEAP modelling technique.

Led by UmU, this will implement a macro energy analysis using simulation tool within a town district in Umea. This entails simulation studies and data gathering of retrofit need for buildings to enable the development of a decarbonization zone (DZ).The aim is to conduct an energy-analyses to determine what is possible technically and how locally produced RES can be utilized by buildings in the area. The model will include a simulation of PV-cells and will conduct a simulation of selected buildings to see the potential of energy efficiency and energy generation in the area. Based on the data and simulations the aim is to develop recommendations/scenarios for the decision makers to facilitate transition towards DZs. We will compare simulation results from Umeå and the Twin City platform in Bodø to identify advantages to a district level approach demonstrating pathways towards net-zero emissions.

Activity 2.2 Best practice models for energy efficiency, management and monitoring.

Led by the city of Umeå. This activity will take a collaborative approach to document and disseminate a minimum of five best practice tools, models or techniques that are currently being implemented in the NPA partner regions to manage, monitor and assess energy efficiency. The key objective of this task is to facilitate knowledge transfer, to identify best practices which can be replicated across the NPA, and to facilitate improvement and upscaling of these best practices through partner collaboration. This will allow partner regions to influence best practice improvement and implementation. This will be a key input for the legacy of the project. Best practices include (but are not limited to):

1. Climate View (Umea)
2. Rural Municipal Building Energy Management Tool (Cork)
3. Twin City Energy Management Tool (Bodo)
4. Energy Pathfinder (NPA regional partners)
5. Energy Key (Tórshavn)

Activity 2.3 Energy monitoring and management tool for housing.

Led by CCC. CCC,NCE, OS, Tórshavn and Umea will collaborate and develop an innovative energy monitoring tool(s) to cater for social and rural housing buildings. This will build upon the experience of developing the Municipal Building Energy Monitoring Tool (under previous NPA and national funding) by extending functionality to cater for housing. This will involve developing a pilot to monitor the effects of a social and rural housing energy systems in relevant pilot regions, which will demonstrate the benefits of housing retrofit to the end user. This is a key component of the DZs in each region and will assist the partners in demonstrating the value, both financially and environmentally, of housing retrofit to tenants. This is currently a concern due to a lack of awareness, which is preventing tenants from realising the financial rewards of energy retrofit. At least two of the collaborating regions will provide a number of housing units to develop, trial and test the upscaled tool(s).

Activity 2.4 Energy monitoring and behavioural change for educators and educational facilities.

Led by NCE. The Cork region will collaborate with the Swedish and Norwegian regions to develop a behavioural change energy management system for 2nd level students, and 3rd level Architecture students, which will provide a live demonstration on the benefits of decarbonisation. This tool will be developed collaboratively and piloted in Cork and will provide live data streams and monitoring reports. The energy monitoring will allow schools to understand their energy usage which will provide key insights into the steps and processes required to reduce their energy consumption, resulting in monetary and carbon savings. Measuring and verifying energy usage prior to implementing any corrective actions gives schools a clear view of the benefits and rewards affiliated with future energy reduction strategies. An educational module will be implemented over a 12 week term as part of the pilot and will educate young people and future professionals in the areas of sustainability and DZ awareness.

3.5.3 Activities addressing Objective 3

The final sub-objective of the HYBES project focuses on demonstrating how effective flexible renewable energy solutions can help to achieve Near Zero Energy Buildings (NZEB). For the purpose of the HYBES project, much of the focus will be on solar and geothermal energy solutions in remote and Arctic communities. This will also consider how excess storage from renewable energy systems

can be shared to facilitate electric vehicle (EV) charging, as well as energy sharing in instances of over-capacity demand. The activities that the HYBES project will implement to deliver this objective have been outlined and briefly described below:

Activity 3.1 Demonstrate solar energy solutions for decarbonisation.

Led by NCE. NCE will work with NRI and Bodø to pilot and demonstrate flexible solar energy solutions in their respective regions. This will involve a minimum of four pilot sites, which will be jointly implemented. In Cork, NCE, with Associate Partner CHA will provide a pilot site of four social homes retrofitted with the installation of a combination of solar panels, storage, smart meters, and storage heaters where energy consumption will be managed through a cloud based management system. Another NCE pilot will be a community building incorporating solar panels and deep fabric retrofit. Bodø will provide two pilot sites implementing solar energy solutions incorporating technologies that include both top roof solar panel and BIPV (façade integrated) systems. These 4 pilots will act as showcases and examples to demonstrate the value of solar energy, storage and smart energy solutions as a pathway to obtaining Near Zero Energy Buildings (NZEBs) in remote and arctic climate zones.

Activity 3.2 Energy reduction and fossil fuel replacement.

Led by NCE. Within the NPA region, the reliance on fossil fuels is still prevalent, and presents significant challenges in the transition to climate neutrality. Many citizens within rural and peripheral areas heavily rely on fossil fuels for home heating and are sceptical of alternative solutions. This collaborative activity will demonstrate the value of building retrofit for tenants in partner regions. Cork and Tórshavn regions will both provide sites for the piloting of housing retrofit techniques. Within Cork, four social houses will be retrofitted to achieve a B2 energy rating including fabric and attic insulation, air tightness and integration of heat pumps. These houses will also be used to test the Energy Monitoring and Management tool for housing developed in WP3. Tórshavn will invest in retrofitting a minimum of three municipal buildings which will facilitate the transition away from oil heating in buildings to more sustainable methods, thus actively enabling decarbonisation.

Activity 3.3 Geothermal solutions for decarbonisation.

Led by OS. Geothermal systems are widely used in Iceland, already preventing fossil fuel use for heating. The condition for geothermal energy in Norway and the Faroe Islands is less optimal for direct use, but is currently being utilised with heat pumps. Geothermal heating systems have advantages also in peripheral areas either of grid or outside district heating areas, as long as the electricity required is also renewable. Geothermal or ground source heating systems in future will play a vital role as storage systems and enable efficient and flexible use of renewable energy resources. Three cases will explore the geothermal energy systems, and this transnational cooperation will facilitate capacity building and learning:

1 Iceland: Off-grid renewable electric power generation for heat pumps and charging stations in remote areas and energy solutions for boats at offgrid islands.
2 Norway: Two municipal buildings in Bodø.
3 Faroe islands: Small residential area in Torshavn.

Activity 3.4 Energy infrastructure for low carbon transport systems.

Led by NRI. Transportation represents a main contributor to CO2 emissions. There is an urgent need to speed up the transformation of transport systems to use RES. In towns such as Umeå and Bodø charging structures for EV is built up. Scaling up the use of EV depends on co-creation processes in planning for optimal deployment of charging points. There are challenges for energy infrastructure especially in peak demand periods. Particular focus will also be in relation to peak energy savings and infrastructure performance. To develop solutions to ease the energy infrastructure is essential. In Umeå and Bodø we will investigate two cases of flexible RES in city districts to create a storage and sharing systems for EV. Another case in Bodø is the greening of maritime transportation. National authorities have decided to build a hydrogen powered ferry between Bodø and Lofoten. The focus of this activity is the planning for the infrastructure for a hydrogen supply system and power station.

3.6 Conclusion

Deliverable 1.1.1 has considered the key national, regional and local policies and legislation in place in each of the HYBES partner regions (Ireland, Norway, Sweden, Iceland and the Faroe Islands) in relation to climate action and decarbonisation, and this has been undertaken to provide a policy roadmap for the NPA region to guide the project objectives and activities. This deliverable has also provided a Joint Action Plan for the HYBES project, considering the joint activities that are being undertaken by the project, outlining deadlines for the delivery of these activities and deliverables, and assigning responsibilities to the partners for their achievement.

The content of this deliverable will be a key input into the management of the HYBES project, while it will also have a critical role in the final project deliverable, **1.8.1 Capitalisation Plan for the HYBES project**. As part of this final deliverable, the HYBES project will consider any policy changes that have occurred in the partner regions between the beginning and end of the project and comment on the impact of these (potential) changes on the delivery of the HYBES project objectives and outputs. This deliverable will also assess the success of the project and discuss opportunities within each of the partner regions to capitalise and expand on the project results and outputs. This will include analysis of potential future funding streams, both locally and internationally. Finally, **Deliverable 1.8.1** will assess opportunities for possible replication across the NPA region (and further afield).

Appendices

1 Appendix : HYBES Activities

Activity	Title	Partner Responsible	Supporting Partners	Period
Changing citizen behaviour: Living Lab for Co-Creation and capitalisation for decarbonization **WP1 Leader: NRI & UCC; WP1 Co-Lead: CCC**				
1.1	Development of the Joint Action Plan and regional policy analysis.	CCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 1 – Period 2
1.2	Communication and Dissemination Strategy and implementation.	NRI	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 1 – Period 6
1.3	Identify and design a Living Lab model to be implemented for activities in the partner regions.	UCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 1
1.4	Consultative Stakeholder Workshops.	UCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 1 – Period 2
1.5	Interactive Engagement Spaces and Co-Creation Cafes.	UCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå	Period 2 – Period 5
1.6	Cultural Events and Festivals as platforms for developing decarbonisation awareness.	UCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå	Period 2 – Period 6
1.7	Guide to deliver the Living Labs model as a tool for the delivery of behavioural change for decarbonisation in other NPA regions	UCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 4 – Period 6
1.8	Capitalisation Plan.	CCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 4 – Period 6
Energy efficiency and management: Monitoring and assessment **WP2 Leader: UmU; WP2 Co-Lead: Umea**				
2.1	Macro energy analysis using the LEAP modelling technique.	UmU	BK, NRI, Umeå, UmU	Period 1 – Period 4
2.2	Best practice models for energy efficiency, management and monitoring.	Umeå	BK, CCC, NCE, NRI, US, UCC, Umeå, UmU	Period 1 – Period 3
2.3	Energy monitoring and management tool for housing.	CCC	CCC, NCE, OS, US, Umeå, UmU	Period 1 – Period 5
2.4	Energy monitoring and behavioural change for educators and educational facilities.	NCE	BK, CCC, NCE, NRI, UCC, Umeå, UmU	Period 1 – Period 4
2.5	Decarbonisation as an influencer for educational curriculum change.	NCE	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 4 – Period 6
2.6	Citizen's guide to decarbonisation: An end-users guide to influence behavioural change.	CCC	BK, CCC, NCE, NRI, OS, US, UCC, Umeå, UmU	Period 3 – Period 6
Flexible renewable solutions for the NPA region **WP3 Leader: NCE; WP3 Co-Lead: CCC**				
3.1	Demonstrate solar energy solutions for decarbonisation.	NCE	BK, CCC, NCE, NRI	Period 1 – Period 4
3.2	Energy reduction and fossil fuel replacement.	NCE	CCC, NCE, US, Umeå, UmU	Period 1 – Period 4
3.3	Geothermal solutions for decarbonisation.	OS	BK, NRI, OS, TK	Period 1 – Period 5
3.4	Energy infrastructure for low carbon transport systems.	NRI	BK, CCC, NCE, NRI, OS, US, UCC, Umeå	Period 1 – Period 4

2 Appendix: HYBES Deliverables

Deliverable	Title	Partner Responsible	Delivery Period
WP1 Leader: NRI & UCC; WP1 Co-Lead: CCC			
1.1.1	Joint Action Plan for the HYBES project.	CCC	Period 2
1.2.1	Communication Strategy.	NRI	Period 1
1.2.2	Tools for communication and dissemination.	NRI	Period 2
1.3.1	Living Lab model Report.	UCC	Period 1
1.4.1	Five Quadruple Helix (QH) regional stakeholder workshops.	UCC	Period 2
1.4.2	Report on Stakeholder workshops and key recommendations for policy.	UCC	Period 2
1.5.1	Report on implementation of three Co-Creation Cafes.	UCC	Period 5
1.6.1	Reports on Cultural Events and Festivals as platforms for developing decarbonisation awareness.	UCC	Period 5
1.7.1	Technical guide on the Living Labs as a tool for delivering behavioural change for decarbonisation.	UCC	Period 6
1.7.2	Stakeholder report on the effectiveness of the Living Labs model.	UCC	Period 6
1.8.1	Capitalisation Plan for the HYBES project.	CCC	Period 6
WP2 Leader: UmU; WP2 Co-Lead: Umea			
2.1.1	Technical report on macro energy analysis for delivery of DZs in Umea and Bodø.	UmU	Period 5
2.2.1	Report on best practice models for energy efficiency, management and monitoring.	Umeå	Period 3
2.3.1	Technical report on energy Monitoring and Management tool for social housing.	CCC	Period 6
2.4.1	Collaborative report on energy monitoring and behavioural change for educational facilities.	NCE	Period 5
2.4.2	12-week educational module.	NCE	Period 5
2.5.1	Report on the potential for educational curriculum change for the delivery of decarbonisation goals.	NCE	Period 6
2.6.1	Citizen's guide to decarbonisation: An end-users guide to influence behavioural change.	CCC	Period 6
WP3 Leader: NCE; WP3 Co-Lead: CCC			
3.1.1	Report on solar energy solutions for decarbonisation.	NCE	Period 6
3.2.1	Technical report on the benefits of energy retrofit to facilitate fossil fuel replacement.	NCE	Period 6
3.3.1	Technical report on geothermal energy solutions for decarbonisation.	OS	Period 5
3.4.1	Report: Create an energy system for storage and energy sharing in city districts for EV.	NRI	Period 6

Output	Title	Programme Indicator	Measurement Unit	Target Value	Delivery Period	Description
WP1 Leader: NRI & UCC; WP1 Co-Lead: CCC						
1.1	Living Labs model as a tool to facilitate behavioural change for decarbonisation.	RCO116_2.1: Jointly developed solutions	Solutions	1	Period 6	The Output is a validated Living Lab model based on feedback from beneficiaries in the five partner regions, which will be rigorously collected and analysed and will provide the basis for disseminating and replicating the model in other regions. The ambition of HYBES is to learn from using the living lab approach and to improve it as a tool for behavioural change of stakeholders and citizens.
1.2	HYBES transnational partnership.	RCO87_2.1: Organisations cooperating across borders	Organisations	13	Period 6	This indicator counts the number of HYBES partners and associated partners.
WP2 Leader: UmU; WP2 Co-Lead: Umea						
2.1	Jointly developed energy monitoring and management tool for housing.	RCO116_2.1: Jointly developed solutions	Solutions	1	Period 6	CCC, OS, & US will collaborate to develop an energy monitoring and management tool for housing. This will be implemented in social and rural housing units in the partner regions and will assist both the municipalities and citizens to demonstrate the value, both financially and environmentally, of housing retrofit. This tool will be transferable across the NPA region for energy monitoring and assessment. Achievement of the output will be demonstrated by a final report on the software.
2.2	Jointly developed energy monitoring and educational tool for educators and educational facilities.	RCO116_2.1: Jointly developed solutions	Solutions	1	Period 5	A collaborative approach will be enabled to develop an energy monitoring and educational tool that will be piloted and tested in the Cork Decarbonisation Zone.
WP3 Leader: NCE; WP3 Co-Lead: CCC						
3.1	Pilot Solar installations in Ireland and Norway and their impact on Decarbonisation.	RCO84_2.1: Pilot actions developed jointly and implemented in projects	Pilot Actions	4	Period 6	The project will provide four pilot sites (two in Cork and two in Bodø, which have a mixture of buildings that have been retrofitted during the lifetime of the project with a combination of solar panels, storage, fabric insulation and smart meters. These units will be demonstrator sites to educate citizens on the financial and environmental benefits of decarbonisation. This output will be summarised in D.3.1.1.
3.2	Retrofit of buildings in Cork and the Faroe Islands	RCO84_2.1: Pilot actions developed jointly and implemented in projects	Pilot Actions	2	Period 6	This output will be the retrofit of buildings in two pilots in Cork and the Faroe Islands and will involve fabric and attic insulation, airtightness and integration of heat pumps. This will act as a tangible demonstrator for the success of building retrofit, in terms of the transition from fossil fuels to clean energy. The Cork sites will also act as a demonstrator for the Energy Monitoring and Management tool for housing developed in WP2.
3.3	Flexible RES solutions using geothermal off-grid in Iceland, Norway, and the Faroe Islands.	RCO84_2.1: Pilot actions developed jointly and implemented in projects	Pilot Actions	3	Period 6	This output will evaluate tree pilots. On behalf of these pilots, we will: 1. Document solutions and the effect of flexible RES based on geothermal energy in off grid districts. 2. Evaluate solutions using geothermal energy as a storage system in

						combination with other RES. 3. Monitor actual energy and functionality. This output will contribute to up scale the transition towards green energy implementing two solutions.
3.4	Model and guidelines for storage and sharing in city districts for EV based on RES resources in Sweden and Norway.	RCO84_2.1: Pilot actions developed jointly and implemented in projects	Pilot Actions	2	Period 6	This output will evaluate two pilots that will show how to optimize energy sharing for district transport needs will avoid sub optimizing and support low carbon transformation in cities and allow for knowledge sharing and potential replication.
3.5	HYBES model for increased energy efficiency and local energy generation as a scalable method.	RCO116_2.1: Jointly developed solutions	Solutions	1	Period 6	This solution gathers the learning from the pilot actions, demonstrating the value of solar energy energy, storage and smart energy solutions as a pathway to obtaining Near Zero Energy Buildings (NZEBs) in remote and Arctic communities. This includes geothermal energy, showing its vital role as a storage system to enable efficient and flexible use of renewable energy resources. Furthermore, it includes a model for how flexible RES in city districts create a storage and sharing systems for EV.